

SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE
OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION
FOR THE ADVANCEMENT OF SCIENCE.

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

WASHINGTON MEMORIAL INSTITUTION FOR POST-GRADUATE STUDY AND RE- SEARCH IN WASHINGTON.

DURING the past winter and spring there has been in Washington an active movement having for its object the founding of an institution to facilitate the utilization of the various scientific and other resources of the Government for purposes of research. The aim is cooperation with universities, colleges and individuals in rendering available to men and women the practical post-graduate training which cannot be obtained elsewhere in the United States and which is now available in Washington to a limited degree only.

The movement originated in the Washington Academy of Sciences, which appointed a committee to take charge of the matter. This committee consisted of the president of the Academy, Hon. Charles D. Walcott (chairman); Hon. Carroll D. Wright, Commissioner of Labor; Dr. C. Hart Merriam, of the Department of Agriculture, and Mr. Marcus Baker, of the Geological Survey. Communication was at once established with the board of trustees of the George Washington Memorial Association, who appointed a committee to cooperate with the committee of the Washington Academy, consisting of Mrs. Archibald Hopkins, president of the Association, Mrs. Phoebe A. Hearst and Mrs. L. M. D. Sweat. These

two committees formulated and submitted a plan of agreement, which was approved by the board of managers of the Washington Academy on February 26, 1901, and by the board of trustees of the Memorial Association on March 13, 1901. This plan provided for the founding in the city of Washington of an institution to be known as the *Washington Memorial Institution*.

The objects of the George Washington Memorial Association are, first, as implied in its name, the creation of a memorial to George Washington; and second, as stated in its amended act of incorporation, the increase in the city of Washington of opportunities and facilities for higher education, as recommended by George Washington in his various annual messages to Congress, notably the first—*i. e.*, 'the promotion of science and literature' substantially as set forth in his last will, and by and through such other plans and methods as may be necessary or suitable. The object of the Washington Academy of Sciences, the federated head of the scientific societies of Washington, is the promotion of science, the term 'science' being used in its general sense—'knowledge; comprehension of facts and principles.'

The two organizations agreed, first, that although American universities have so developed since George Washington's time that they fulfill many of the objects of the national university outlined by him as desirable for the youth of the United States, there is still need of an organization in the city of Washington which shall facilitate the utilization of the various scientific and other resources of the Government for purposes of research, thus cooperating with all universities, colleges and individuals in giving men and women the practical post-graduate training which cannot be obtained elsewhere in the United States and which is now available only to a limited degree in the city of Washing-

ton; and second, that the best method of securing the objects for which both organizations stand is the establishment, within the District selected by Washington as a site for the permanent seat of government of the United States, of an institution whose object shall be the realization of Washington's repeatedly expressed wish and recommendation that provision be made for the *promotion of science and literature*.

In the further carrying out of cooperation, it was agreed that the George Washington Memorial Association would undertake to secure a suitable site and erect thereon a substantial, dignified building sacred to the memory of George Washington; and that the Washington Academy of Sciences would undertake to provide for the maintenance and conduct of the institution in the interest of science and literature; and that there may be joined with it in this work the National Educational Association, the Association of American Universities, and the Association of Agricultural Colleges and Experiment Stations.

The Washington Academy at once undertook to secure the passage of a law authorizing the utilization of the resources of the Government Departments for post-graduate study and research. Such an act of Congress was approved March 3, 1901, and reads as follows:

That facilities for study and research in the Government Departments, the Library of Congress, the National Museum, the Zoological Park, the Bureau of Ethnology, the Fish Commission, the Botanic Gardens, and similar institutions hereafter established shall be afforded to scientific investigators and to duly qualified individuals, students, and graduates of institutions of learning in the several States and Territories, as well as in the District of Columbia, under such rules and restrictions as the heads of the Departments and Bureaus mentioned may prescribe.

The plan of organization next agreed upon by the two committees was essentially as follows:

1. *Organization*.—A private foundation independent of Government support or control.

2. *Objects*.—(a) To facilitate the use of the scientific and other resources of the Government for research.

(b) To cooperate with universities, colleges and individuals in securing to properly qualified persons opportunities for advanced study and research now obtainable only to a limited extent in Washington and not at all elsewhere.

3. *Government*.—The policy, control and management to vest in a board of fifteen trustees, and in addition there shall be an *advisory committee* composed chiefly of the heads of Executive Departments, Bureaus, etc.

The two committees drew up articles of incorporation, which were filed May 20, 1901.

On May 27, 1901, the incorporators met and elected the following board of trustees:

1. Dr. Edwin A. Alderman, President, Tulane University.
2. Prof. A. Graham Bell, Regent, Smithsonian Institution.
3. Dr. Nicholas Murray Butler, Professor of Philosophy and Education, Columbia University.
4. Dr. C. W. Dabney, President, University of Tennessee.
5. Dr. D. C. Gilman, President, Johns Hopkins University.
6. Dr. A. T. Hadley, President, Yale University.
7. Dr. Wm. R. Harper, President, University of Chicago.
8. Mrs. Phoebe A. Hearst, Regent, University of California.
9. Mrs. Archibald Hopkins, President, George Washington Memorial Association.
10. Dr. C. Hart Merriam, U. S. Department of Agriculture.
11. Dr. Cyrus Northrop, President, University of Minnesota.
12. Dr. H. S. Pritchett, President, Massachusetts Institute of Technology.
13. Dr. George M. Sternberg, Surgeon-General, U. S. A.
14. Hon. Charles D. Walcott, President, Washington Academy of Sciences, and Director, U. S. Geological Survey.
15. Hon. Carroll D. Wright, U. S. Commissioner Labor.

On June 3 the trustees met and elected the following officers:

Dr. D. C. Gilman, President, Johns Hopkins University, Director.

Hon. Charles D. Walcott, Director, U. S. Geological Survey, President Board of Trustees.

Dr. Nicholas Murray Butler, Columbia University, Secretary Board of Trustees.

Mr. C. J. Bell, President, Washington Security and Trust Co., Treasurer.

ADVISORY BOARD.

President of the United States.
 Chief Justice of the United States.
 Secretary of State.
 Secretary of the Treasury.
 Secretary of War.
 Secretary of the Navy.
 Secretary of the Interior.
 Secretary of Agriculture.
 Postmaster-General.
 Attorney-General.
 Secretary of the Smithsonian Institution.
 Commissioner of Education.
 Librarian of Congress.
 Commissioner of Labor.
 Commissioner of Fish and Fisheries.
 President of the Civil Service Commission.
 President of the National Academy of Sciences.
 President of the National Educational Association.
 President of the Association of American Universities.
 President of the Association of Agricultural Colleges and Experiment Stations.
 Dr. Charles W. Eliot.

TRUSTEES.

1903.	1904.	1905.
A. G. Bell,	E. A. Alderman,	N. M. Butler,
C. W. Dabney,	C. H. Merriam,	A. T. Hadley,
D. C. Gilman,	C. Northrop,	W. R. Harper,
P. A. Hearst,	H. S. Pritchett,	C. E. Hopkins,
C. D. Walcott.	G. M. Sternberg.	C. D. Wright.

The new institution will attain substantially the objects desired by the advocates of a National University, without being subject to the objectionable features of a university sustained by the Government in competition with the existing universities.

The committee of the Association of Agricultural Colleges and Experiment Stations on post-graduate study and research in Washington met and approved of the organization of the Washington Memorial

Institution; and it is understood that the committee of the National Educational Association on the question of establishing a National University in Washington approves the plan and purposes of the Washington Memorial Institution. The Washington Academy of Sciences, having turned over to the new organization the conduct and maintenance of the Washington Memorial Institution, will now cooperate with the George Washington Memorial Association in the erection and maintenance of a memorial building to be dedicated to science, literature and the liberal arts.

*ADDRESS OF THE PRESIDENT OF THE
AMERICAN MEDICAL ASSOCIATION.**

IN approaching the discharge of my duties as presiding officer of the fifty-second session of the American Medical Association, I beg to express my appreciation of the generous suffrages by which I have been called to a position of such conspicuous honor. This appreciation becomes all the more pronounced when I reflect upon the magnitude and achievements of this great national body and upon the luster of the distinguished men who have presided over its deliberations. This thought brings me to the first duty of the occasion, and that is officially to bring to your attention the fact that since our last reunion three of my most illustrious predecessors have been called from their worldly activities to the realm of rewards. Alfred Stillé, Lewis A. Sayre and Hunter McGuire, each a former president of the Association, died within a single week. Their lives were known of men, their records are ornaments of our annals, and their achievements are their eulogies. They labored zealously and with beneficent results, not alone in the scientific field, but in behalf of an organized national profession; and to guard zealously

the splendid legacy which they, among others, have left us, must be one object of our labors upon this auspicious occasion. The hope is indulged that steps may be taken to procure suitable portraits of these and of other deceased presidents of the Association, to be placed in some safe gallery until such time as the Association may be able to transfer them to its own Temple of Fame. I recommend that suitable formal action be taken on this occasion relative to the life, distinguished services and the death of these lamented confreres.

FOREIGN RELATIONS OF THE AMERICAN
MEDICAL ASSOCIATION.

The American Medical Association accredited delegates during the last year to several foreign medical conventions, notably the International Medical Congress at Paris, the Dominion Medical Association of Canada, the Mexican National Association and the Pan-American Medical Congress at Havana. To each of these organizations the American Medical Association sustains relations of peculiar intimacy. As one of the great scientific nations of the earth, the United States is naturally an integral part of the International Medical Congress. This Association, by a resolution presented by your present executive officer, took the initiative in 1891, in organizing the Pan-American Medical Congress. The first reunion of that Congress was held in Washington in 1893, under the presidency of the late lamented Dr. William Pepper. The second was held in the City of Mexico in 1896 under the presidency of Dr. Carmona y Valle, while the third has been held during the last few months in the City of Havana under the distinguished presidency of Dr. Juan Santos Fernandez. This movement has for its object the establishment of closer relations between the medical profession of the different countries of the Western Hemisphere. It has already

*Delivered before the Fifty-second Annual Session at Saint Paul, Minn., June 4, 1901.

borne excellent fruit in the increased patronage of our medical schools from the far south, in the improved status of American medical practitioners in Latin America, in a better understanding of quarantine questions in the different countries, and in the development of a concert in the investigation of the medicinal flora of the Western Hemisphere. Our relations with the medical profession of Canada must be of increasing intimacy, and I indulge the hope that, while maintaining the national limitations of our Association for delegate and legislative purposes, its membership, with the privilege of participating in all scientific matters, may be freely opened to our brethren who live beyond our immediate borders.

FISCAL AFFAIRS AND THE JOURNAL.

It has passed into unwritten law, born of the gradually developing features of our organization, that your president shall restrict his annual address to a discussion of the affairs of the Association and to the great object to which, by the terms of its Constitution, it stands consecrated—'the common interests of the medical profession in every part of the United States.' In compliance with this rule, and realizing that I am leaving scientific questions to be presented by orators appointed for the purpose, I have pleasure in calling your attention to the satisfactory condition of the affairs of the Association, as indicated by the consolidated report of the Treasurer and of the Board of Trustees. From it you will observe that under the judicious management of your Board of Trustees you had a cash balance at the end of the last fiscal year of \$31,004.67, being an excess of \$3,696.66 over the preceding year. Your plant has been increased in value to the amount of nearly \$10,000.00, and the net profits of the *Journal* amounted to nearly \$14,000.00. You will be gratified to realize that, in ad-

dition, you have safely invested as part of a fund with which to buy a home for the *Journal* and for the Association, the respectable sum of \$25,000.00. If, however, you have occasion to feel satisfied with the normal condition of your finances, you must contemplate with pride the rapid increase of your *Journal*, in quality, size, circulation and influence. The average weekly circulation grew, during the last fiscal year, from 13,672 to 17,446, and I have added pleasure in informing you that, since the period covered by the report, the weekly circulation has grown to 22,000 copies. For the accomplishment of these splendid results, I feel that you will join me in hearty acknowledgment, not only of the sagacious management by the Board of Trustees, but the tireless industry and the discreet direction of our accomplished editor, Dr. George H. Simmons.

I feel that it is important, however, to call your attention to the fact that it would have been impossible for your Board of Trustees to have accomplished these results if, through its action, the Association had not become incorporated. Leases were to be executed, purchases were to be made, contracts were to be entered into, money was to be loaned and bonds were to be exacted, to do all of which it was necessary that the Association should become a legally organized corporation. This was affected, *ad interim*, by the action of your Board of Trustees, which procured articles of incorporation under the laws of Illinois, bearing date of April 14, 1897. I am not aware that this fact, attested by the document which I have laid before the Executive Committee, has ever been confirmed by the vote of the Association. I recommend, therefore, that such action be taken at the present session.

If, however, the condition of the Association, and particularly of the *Journal*, is, on the whole, occasion for much satisfaction,

certain facts revealed by the report are food for thought. Thus, the *Journal* has an aggregate circulation two and one-half times greater than the aggregate membership of the Association. It would seem, therefore, that while the profession at large prizes the *Journal*, it places relatively less than half as much value upon membership in the Association. This fact becomes strikingly significant when it is remembered that membership can be acquired by those who are eligible at no additional expense and with but trifling inconvenience. Does the *Journal* fulfill all the wants of the profession arising in connection with the Association? Are there no additional advantages to be derived from membership? Is there a lack of *esprit du corps*—a lack of the sense of unity in the profession? Is the existing basis of our national organization distasteful to the majority of the practitioners? Do our subscribers embrace a considerable number of practitioners, who, under existing rules, cannot become members, and whose influence, therefore, cannot be secured in behalf of the Association? These are questions that I am at liberty to ask, and that you are at liberty to answer.

Another thought suggested by the report relates to the disposition of the accumulating surplus. Shall the present policy for creating a fund for the purchase of property be carried out? Shall a larger proportion of the money be expended in still further exploiting the *Journal*? Shall the members receive a direct advantage from the earnings of the property which they have created, by reducing the annual dues, or shall a certain proportion of our surplus be expended in conducting original scientific investigations on subjects of universal interest to the profession? I cannot resist the temptation in this connection to venture replies to these questions far enough to say that, in my opinion, a reserve should be held in hand large enough to meet any pos-

sible contingencies that might occur by fire or other disaster in connection with the *Journal*; that the present generous policy in promoting the welfare of the *Journal* should be continued; that the dues of the Association should not be decreased; and that the question of establishing and defraying the expenses of certain commissions for special scientific investigators should be taken under serious consideration. The question of tuberculosis is not yet a closed chapter. The causation of cancer is yet a sealed mystery. The problems of tenement-house reform are not yet solved. The prevention of various endemic diseases has not yet been made practicable. The systematic investigation of the American medicinal flora, begun under the auspices of this Association more than forty years ago, remains an uncompleted task. These are a few among the many objects of a specific character which demand and should receive the fostering care of the Association.

I feel, however, that at the present moment, and under the existing features of our organization, it would be almost impossible to determine, judiciously, either of these very important questions, and I now bring them before the Association only for the purpose of directing attention to them, with the hope that they may be taken up subsequently, and under more auspicious circumstances.

SCIENTIFIC WORK OF THE ASSOCIATION.

The Association began its career with general meetings, devoted chiefly to questions of medical education and professional conduct and to lengthy reports from various standing committees. In 1860 it divided itself into a few sections, each with a certain autonomy, and each devoted to a particular part of our great scientific work. This change was followed by the establishment of the Judicial Council, by which means controversial questions, many of

them of a personal character, were eliminated from the general meetings. The subsequent creation of the Executive Committee still further relieved the general meetings of annoying details. Thus relieved, both the general meetings and the sections have grown in scientific importance, emphasizing the persistence of our devotion to what must ever be recognized as the essential, fundamental object of our organization—the cultivation of the medical sciences. It must be acknowledged, however, that great as has been the progress in this particular, too much of the time of our general sessions is yet devoted to the consideration of matters which might, with propriety, be relegated for final action to a smaller body. It would redound largely to the interest of our annual session if the general membership could be entertained and instructed at our general meetings by exercises of a more purely scientific character, of such broad nature that they should not be restricted to any of the sections. A reform in this particular will be a long step in the direction of progress. The sections, in consequence of the faithful labors of their officers, offer strikingly attractive programs for the present session. In several of the lists will be found the names of invited guests who, through fortuitous circumstances, are not members of the Association, but who are, nevertheless, active workers in the scientific field, and whose participation in our labors will enrich the value of our proceedings and enhance the felicities of the occasion. I bespeak for them your cordial welcome. While the officers of sections and your president have exercised the prerogative of inviting guests, who come as guests, and not as members of any class, as specified by the Constitution, such invitations have been extended solely with the object of advancing the interests of the Association. I look upon this privilege, which has been exer-

cised by all of my predecessors and by previous officers of sections, as one of extreme importance, and one which should be continued under any plan of reorganization which may be adopted. It is my conviction, however, that the privilege should be hedged about by certain limitations, one of the most important of which should be that an invitation should not be extended a second time to any person residing within the United States whose professional qualifications may entitle him to membership. With reference to the invitation of persons identified with the allied sciences, the matter should be left absolutely to the discretion of the president of the Association and with the officers of sections.

CONGRESSIONAL AND STATE LEGISLATIVE AFFAIRS.

The American Medical Association, during the first fifty years of its existence, exerted relatively little influence upon legislation, either State or national. Since the standing Committee on National Legislation and the National Legislative Council of delegates from the State Societies have been established, and have become cooperative, there is some evidence that the voice of the profession is headed at Washington. The experience of the splendid committee of this Association, acting in concert with the National Legislative Council during the last year, has, however, shown the serious necessity for more thorough organization in protecting the interests of the profession and the interests of society, as represented through the profession. The inefficiency of our present organization for influence upon Congress was shown in the inability of your committee, notwithstanding its strong personnel and the influences at its command, to prevent the degradation of the army medical service. This was accomplished by the passage of a bill under the cham-

pionship of Senator Hawley, by the terms of which the medical corps of the army is subjected to unfair and humiliating discrimination. This law grades the medical department for rank, promotion, and, in consequence, for pay, below every other department and special corps of the army, and, with the exception of second lieutenants, it is graded below the line. In accordance with its provisions, a medical officer, to obtain a colonelcy, must pass through three times as many files as an officer of either the Quartermaster's, the Subsistence or the Pay Departments; more than twice as many as an officer of Engineers or of Ordnance, and nearly twice as many as an officer of the Signal Corps. The effect of this discrimination is not only to lower the rank and pay of medical officers, but must result in lessening the efficiency of the corps by repelling men of spirit and worth.

In every war known to history the deaths from preventable diseases have exceeded those due to battle. At no time has hygienic science been so resourceful as at present in preventing disease. A law which fails to give to armies, either in peace or in war, the fullest protection by the application of the latest scientific developments at the hands of specially trained medical men is unjust to the soldier, to society and to the medical profession. In view of these facts, the army reorganization law of the last Congress was inexplicable and inexcusable. It, however, forces itself upon your consideration from another standpoint. Physicians are citizens of the Republic. As such they are intellectually, socially, politically and officially the equals of any other element of the body politic. There is no station to which they may not attain; there is no distinction of which they may not be the recipients. Their rights are of manhood origin, and their prerogatives are inherent. They are,

in very fact, peers of the realm, and the peers of any peers of any realm. When the status of any number of physicians in their representative relationship to society is lowered, the status of the medical profession in general is menaced in corresponding degree. When the Congress, by the enactment of a law, degrades, relatively, the status of an important body of medical men engaged in the public service, it strikes at the status of every physician in the country. It becomes, therefore, the duty of every member of the medical profession, jealous of his rights, his prerogatives and the fair name he may leave his children to resent, as personal between himself and every member of the Congress who voted for this law, the action which cast a stigma upon our profession.

It has been the conviction of many enlightened members of the medical profession that the means employed by the general government for the protection and promotion of the public health are capable of improvement. These duties have devolved upon the Marine Hospital Service, which was originally designed to give succor to unfortunate people, without other domicile, who were employed upon our rivers, lakes and the high seas. With the growth of sanitary science this service, being the only established agency available by the government for this purpose, has been largely diverted from its original object. As a result, under the present wise administration of its Surgeon-General, its representatives are abroad investigating the sanitary condition of foreign cities, its agents are at our ports beating back threatened epidemics, while valuable investigations are being conducted in its laboratories. In the exercise of its quarantine functions, however, it comes in conflict with the police power that is guaranteed by the Constitution to the different States. The friction thus engendered has been especially marked

in the seaboard States. While this is true, the Marine Hospital Service, in scope and design, does not fulfill in highest degree the objects of a central coordinating agency for the protection of the public health. It was thought to create a Department of Public Health, with its executive officer in the cabinet, but this idea yielded to that of a bureau in charge of a large Advisory Council, composed of representatives from various States. Resolutions have been adopted and memorials have been sent to the Congress, committees have been appointed, money has been appropriated by this Association, bills have been introduced, and hearings have been had in committee, with the result that the conditions to-day are precisely the same that they were ten years ago, when the agitation was inaugurated in the session of this Association held at Washington.

Secretary Wilson, of the Department of Agriculture, in his Report for 1899, recommended that the Congress appropriate money to defray the expense of a systematic investigation of the medicinal flora of the United States and of experiments upon the neutralization of medicinal plants indigenous to other countries. This recommendation was based upon the fact that the United States is the only great country which either has not conducted or is not conducting such experiments, and upon the fact that the proposed measure, touching the avenues of industry, manufacture, commerce and the public health, was one of national concern. This measure, however, with its manifest importance, was denied even courteous consideration, while its friends were denied a hearing by the committees of the Congress.

The cause of failure on the part of this Association to procure legislation by the Congress—and, with the exception of preventing the passage of the anti-vivisection bill last year and securing the enactment of

the quarantine bill this year, our recent efforts must be recognized as failures—I say the causes of our failure are properly subjects for careful consideration. I have examined the records of the Association from the date of its organization, and have been profoundly impressed with the fact that memorials, resolutions, or even more definite propositions addressed to the Congress have, for the most part, represented the views, or rather the impressions, of the individual members proposing them. They have generally been presented in the general meeting and have been endorsed without the deliberation essential for wise action; but a deliberation which is simply impossible in the limited time available in our general meetings. In certain instances memorials to the Congress have been presented at one session of the Association, have been referred to committees and reported back for action, either at a later meeting of the same session or at the succeeding annual session of the Association. But it becomes evident that this course lessens the evil but a trifle, for the reason that the committees to which such matters were referred have been constituted either under the leadership of the member proposing the measure or of members of a standing committee who had no interest in or understanding of the proposed measure. Such memorials, resolutions or propositions, when acted upon affirmatively by the general meeting of the Association, have, possibly, been mailed to some member of Congress or of a Legislature, but were not followed by effective work in the rank and file of the profession or among their patrons. When such bills have been presented to the Congress, and have received a certain amount of support from representatives of this Association, they have, as a rule, attained only that degree of importance that have made them valuable to their ostensible champions, as

something to trade in the game and barter of legislation for something which would please a larger number of constituents and command a larger number of votes. In view of the fact that after all the argument of votes is the only one which appeals effectively to the average Congressman, it behooves this Association, in its efforts to conserve the interests of the profession and of society, to put itself in a position to influence the largest number of votes. Every physician, therefore, should, in a perfectly respectable sense, become an active working politician. This subject, however, is of such breadth and of such depth that it may be well for us to pause at this juncture long enough to consider, from the standpoint of fundamental facts, the relationship of physicians to each other, and of the medical profession in the aggregate as an integral factor in society.

THE PROFESSION, THE ASSOCIATION AND THE COMMONWEALTH.

In approaching a study, however brief, of the relation of the medical profession to the state or, as I prefer to call it, the commonwealth, I feel that I am inviting your attention to an eminently practical theme; one which may enable us to understand the influences by which we have arrived at our present estate, and the means by which we may advance to even greater achievements. As we approach this theme—this eminently practical theme—we discover that the status of the medical profession, like that of every other element of that complex whole which we call society, is a perfectly natural one. Whatever it may be, it has been attained in the process of evolution and has been and is determined by laws as immutable as those which govern the commingling of atoms or the sidereal strides of the planets. It is not the result of conventions or of resolutions or of statutory enactments; but these are to be interpreted rather as in-

diciæ, for the time being, of the position of the profession in the body politic. They are, indeed, consequences rather than causes, and as such they are subjects for careful inquiry. It is by a study of them that we are enabled in part to determine those laws, those natural laws, our harmony with which is essential not alone for the present usefulness and continued progress of the profession, but for the ability of the medical profession to conserve the welfare and promote the happiness of society at large.

But I have said that the position of the medical profession is a natural one. The truth of this declaration is apparent when we go back to the beginnings of society—when we examine the evidences presented by primitive peoples. We are familiar with the classic example so frequently utilized as a starting point in the discussion of sociologic phenomena—the example of the two aborigines, one of whom makes better arrows, and the other, better mats, than his companion, when, presently, one confines himself to arrows, the other to mats, each trading his own for the other's products. Here is an example of the beginning of what the scientists call 'specialization of function in the social organism.' It is an interesting process, which, based upon varying necessities and diverse aptitudes, results in multiplication of handicraft until somebody is hurt. This is a new necessity, and it is met by a new aptitude, and the possessor of that aptitude—the medicine man, our honored progenitor—steps upon the scene. His companions, appreciating his services, reward him with their arrows and mats; and he, finding the life to his liking, restricts himself to his new-found vocation—and the medical profession is established! As the necessity for his services, whether of charm or incantation, becomes more apparent, the esteem of his fellows becomes more pronounced. As events pro-

gress he is accorded certain rights, given certain prerogatives and hedged about by certain limitations, all calculated to increase his efficiency in promoting the common welfare—and thus is the practice of medicine regulated. He is spared from the battle that he may serve his companions, and he stays away from the chase that he may delve into the great mysteries—and thus is medical education inaugurated. He is the exponent not only of his professional knowledge, but of at least the average intelligence of his people. He is, in short, an integral part of the primitive social fabric. As such he shares the manners, the customs, the aims, the ambitions of his companions; and he, with them, is controlled by the forces which determine the common state and the common destiny. His status is, therefore, determined by the very laws which control the growth and development of society itself. So true is this that, from the dawn of history until the present day, and in every stage of sociologic development, the civilization of a people may be infallibly determined by the intelligence, the efficiency and the influence of its medical profession.

THE MEDICAL PROFESSION AND SOCIETY FIFTY
YEARS AGO.

It would not be to our present purpose to follow the evolution of society as exemplified in any of the civilized peoples, or, as the scientists say, 'distinct ethnic entities of the world,' in which the present complexity has been attained by an orderly succession of events. And it would be equally unnecessary to show, what everybody knows, that the medical profession, the heritor, in common with others, of antecedent influences, has been propelled by the same forces and by equally orderly events to precisely the same standard of civilization. The lesson before us is that of the relation of the medical profession to a society, which,

but a few decades ago, was the most diverse in origin and the most heterogeneous in constitution known to modern history; but a society, which at the dawn of the twentieth century is one of the largest, richest and most intelligent of the world, a society, well amalgamated, and which, by common consent of even adverse critics, is moving in harmony with the most advanced influences of civilization. I fancy I should suddenly find myself unpopular with the audience, if I were to intimate that you, who comprise it—that you, the representatives of the medical profession—have failed to contribute your full quota to the great progress which that society in general has achieved, or that you do not reflect in intelligence and morality the highest type of civilized man. I hasten to allay your apprehension, for I have no such intention. On the contrary, I ask you to indulge with me in a retrospect of American society during the last half dozen decades that we may the better understand the important part that you, and the profession that you represent, have played in the attainment of present results.

As I have already stated, the middle of the nineteenth century found diverse conditions of society in the United States. The older cities of the seaboard were the centers of an advanced civilization. The remoter counties of the same States, however, were then, in the absence of railroads, the telegraph and modern mail facilities, more remote from the centers of American influence than is St. Paul to-day from St. Petersburg. The great tide of emigration that had already poured and was yet pouring over the mountains and spreading in lonely habitations or widely separated communities over the vast valley of the Mississippi from the lakes to the gulf was busily engaged with the serious problems of existence. The forest was to be felled and the prairie was to be subjugated, habitations were to be

built and crops were to be raised. In the midst of these exactions, institutions of higher learning were established, and to an extent patronized, and some strong men were produced. But it must be recognized as true that society in general had but little time and less money to devote either to schooling or to the amenities of life. The medical profession, under these circumstances, was precisely like the community of which it was a part. There were but few medical colleges, and they, for the most part, were but meagerly equipped. Many doctors became such while going from one town to another. Ignorant inventors of alleged systems of cure hawked their wares in the highways and the byways. Dogmatism that was destructive to intelligence was rampant, while schism was fostered by the baneful commercialism that too generally pervaded the heterogeneous mass of forty thousand people that comprised the medical profession. In eight of the twenty-six then existing States, no laws affecting medical practice had ever been enacted; in eleven, laws previously enacted had been repealed; in three only were there any restrictive laws, and these proved inefficient; while the facts could not be ascertained relative to the remaining four States.

THE ERA OF ATTEMPTED VOLUNTARY REGULATION OF MEDICAL PRACTICE.

To remedy these evils, and actuated by the love of science, the promptings of self-interest, and by devotion to the interests of humanity, representatives of the various State medical societies met in convention over half a century ago and organized the American Medical Association, with the avowed object of having its members represent and take cognizance of 'the common interests of the medical profession in every part of the United States.' It sought to cultivate medical knowledge among its members, to elevate the standard of medi-

cal education, to promote the honor and influence and interests of the medical profession and to enlighten the public concerning the relation between the medical profession and society. Emulation and concert of action in the profession and friendly intercourse among those engaged in it were additional aims of the founders of this great body of representative American medical practitioners. A constitution, by-laws and certain rules of conduct were adopted. The constitution provided for a delegate body, delegates being accredited from recognized medical societies, medical schools and eleemosynary institutions. The rules of conduct prescribed in detail the deportment of a physician, the deportment of the patient, interdicted the licensure of sectarian physicians, and proscribed from consultation those whose practice was based upon an exclusive dogma. The influence of the new Association was extended chiefly through the avenues of the various State societies, many of which adopted the rules of conduct that had been prescribed by the newly formed national body as the basis of affiliation. Several of the State societies, notably those of Massachusetts, Rhode Island and Mississippi, finding either that the prescribed rules of conduct were not suitable to their respective local conditions, or feeling that they were sufficiently in touch with the ordinary forces of civilization to require no such formulæ, never adopted the rules of conduct prescribed by the national body. The medical association of Alabama adopted the rules with rather a naïve proviso that somebody be appointed to call attention to such of the special teachings of these rules 'as may seem to require elucidation in view of special circumstances and conditions.' Other State societies adopted more or less modifying resolutions, but the general spirit of ostracism and aloofness was maintained during the succeeding three decades. The

result of this movement was immediately salutary; it developed an *esprit du corps* in the great body of the profession; it gave an authoritative definition to medical education and it created a strong and influential national body within the profession. At the same time, however, it became apparent that the organization did not possess the necessary inherent strength to accomplish its avowed object to regulate the practice of medicine. As time passed schismatic medicine grew apace, its colleges multiplied, its practitioners appeared all over the country, exemplifying that law that always makes the blood of the martyrs the seed of the church. Quackery of the most flagrant character was found everywhere, and society was unprotected from its ravages, while the inability of a voluntary unchartered organization to enact and to execute plenary laws was reduced to a demonstration. The medical profession, as an organized body, discovered that its relation to the commonwealth was, as the result of its own proscriptive policy, scarcely more intimate or more influential than at the beginning of the thirty years hopeless experiment.

THE ERA OF EFFECTIVE LEGISLATIVE CONTROL OF MEDICAL PRACTICE.

The era of effective legislative control of medical practice came as the natural reaction from the demonstrated failure to accomplish the same result through voluntary organization; but it came as the result of the sentiment which had been propagated largely through the influence of this Association. The representatives of progressive medicine, turning from the National Association, invoked the aid of their respective State societies in taking up the question with their respective legislatures. The profession in each State, however, recognizing its own local conditions, proceeded in its own way to attend to its

own business. The very earliest attempts to secure State legislation revealed the fact that the so-called irregular practitioners, under the stimulus of ostracism and the fostering care of public sympathy thereby induced, had become so numerous and so influential that, in the majority of States, nothing could be done without their cooperation. It was no longer a theory, but a condition, with which the real reformers were confronted—and they met it. California, in 1876, through its regular medical society, took the initiative. After conferences with the representatives of the sectarian societies, and after securing their cooperation, a law was procured creating a licensing board composed of representatives of both the regular and sectarian schools of practice. Illinois, confronted by precisely the same condition, took precisely the same course. Alabama, always progressive, but the happy possessor of other conditions, was able to place the regulation of medical practice for the time being under the control of its incomparable State medical association. Colorado created a mixed board. New York, confronted by conditions even more complicated than those in other States, took up the same task. The profession of that State, acting through its organized body, containing among its members many of the most honored and illustrious names in American medicine, found it doubly necessary to enter into treaty with the denominational physicians. It realized, however, that the rules of conduct to which it had always conformed contained, among other provisions, one which made it unlawful to ‘* * * examine or sign diplomas or certificates of proficiency for, or otherwise be especially concerned with the graduation of persons whom they have good reason to believe intend to support and practice any exclusive and irregular system of medicine.’

As the thing expressly interdicted by this

rule was the very thing which it was proposed to do, and which had been done in other States, and which it was very necessary to do in New York, the medical society of that State amended the rules of conduct, so that it or its members might, at discretion, enter into professional relations with any or all persons whom the law of the State at that time recognized to be practitioners of medicine. When this action was brought to the attention of this national body, it resulted, not, as might have been expected, in the amendment or the abrogation of the rule which had grown obsolete in the march of events, but in its tacit reaffirmation and in the opprobrious excommunication, for the time being, of the entire profession of the great Empire State. This action, viewed impartially after the lapse of nearly twenty years, becomes the more extraordinary when it is observed that similar action was never taken with regard to Massachusetts or Rhode Island or Mississippi, the societies of none of which had ever adopted the prescribed rules of conduct; nor with regard to California or Illinois or Colorado, each of which had, by overt act, if not by open declaration, so far as this rule is concerned, taken an equally non-conformist position. It is not surprising that, with such an example before the State societies, the experiment in consistency has not been repeated. But the movement of effective regulative legislation, once inaugurated, happily spread with great rapidity. Mixed boards of licensure are now to be found in the majority of the States of the Union, and in the majority of such boards are to be found members of the American Medical Association engaged in issuing licenses to practitioners of exclusive dogmas, and sitting in consultation with sectarian physicians, not over a dose of medicine, but over the vastly more vital question of the qualifications of those who are to care for the sick of our Republic.

THE MEDICAL PROFESSION AND SOCIETY AT
THE BEGINNING OF THE TWENTIETH
CENTURY.

The result of the twenty-five years of statutory regulation of medical practice are in striking contrast with the results of the quarter of a century of attempted regulations by methods of proscription. At the conclusion of that humiliating experiment, as at the beginning of it, there was not a single effective medical practice law on the statute books of a single State of the Union. To-day there are forty-eight State or territorial licensing boards, most of them being composed of representatives of both the regular and the sectarian schools of practice. The laws of the different States are of varying efficiency, the one procured by the Medical Society of the State of New York, at the price of yet-maintained excommunication from this body, standing to-day as the model of excellence for the entire country. Under the influence of these laws, instigated by members of the American Medical Association, and which, after all, are but expressions of the sentiments of the medical profession confirmed by society at large, many substantial reforms have been accomplished. The medical schools, which in this country have labored bravely and efficiently under adverse conditions, have been stimulated to increased efficiency. One of the first changes accomplished was the practical standardization of requirements to enter practice; and one of the first features of this standardization was to secure for the student 'the aids actually furnished by anatomy, physiology, pathology and organic chemistry'—the four cardinal studies which, strange-sounding as it seems, it was necessary solemnly and specifically to insist upon a half-century ago. It follows, therefore, that with broadened and increasingly uniform curricula, it cannot be said that schools, even of sectarian an-

tededents, entirely 'reject the accumulated experience of the profession,' nor can it be said that, in a sectarian sense, they any longer possess an excuse for existence. Their graduates, or such of them as do not base practice on an exclusive dogma, are, in many instances, met in formal consultation by even conservative regular physicians, and, in more than one instance, are made members of medical societies that are in affiliation with the American Medical Association.

The Illinois State Medical Society, which has always been among the foremost in reform movements within the profession, at its recent annual session, unanimously

"*Resolved*, That the school of graduation shall be no bar to membership in the Illinois State Medical Society, providing such physician is recognized by the local societies as qualified and not claiming to practice any exclusive system of medicine."

The Ohio State Medical Society, by precedent, if not by formal action, established the same rule.

We thus see that the proscriptive rule which, during the more than twenty-five years of its dominance, propagated the very evils it was intended to correct, is rapidly expiring by limitation in the face of new conditions that have been induced, in spite of it, by beneficent and catholic legislation. In the State of New York alone the annual registration of sectarian physicians has diminished nearly ninety per cent. under the operation of its present laws. In the State of Ohio many physicians who are graduates of sectarian schools are making application to have their classification on the register changed to 'regular,' while equal reactionary movements are observable in other States. Thus we observe the passing of homeopathy and eclecticism, just as did the calm scientists of Rome witness the passing of the 'humoralism,' the 'Methodism,' the 'electicism,' and the 'pneumatic school' of that

period; and just as passed the 'chemicalism,' the 'iatro-physical school,' the 'iatro-chemical school,' and the 'brunonianism' and the dozen other 'isms' of later epochs, each leaving its little modicum of truth as the memento of its existence. And let us felicitate ourselves that, with the passing of the particular sectarianism of the last century, there is also the passing of its concomitant evils, such as existed in even greater degree in the time of Galen, who 'found the medical profession of his time split up into a number of sects, medical science confounded under a multitude of dogmatic systems,' and, as if relating the effect of the cause, the historian continues, 'the social status and the moral integrity of the physician degraded.' The further results of this new order of things, however, are observable, not alone in the modified curricula of the medical schools, but in the changed organic relations of the institutions themselves. Under the pressure of legal requirements the weight falls with almost fatal force upon the small, private and poorly equipped institutions. These institutions, in the interest of self-preservation and to protect a respectable alumni, are forced either to expand their enterprises or to seek relations with universities which are deeply founded in the community; or else actually to go out of existence. The majority of the schools seek connection with the universities, by which step alone they become logical objects for endowment, and it is to be hoped that this movement will continue until in this great country medical education shall be as firmly established as it is to-day in any of the transatlantic nations.

Another of the new conditions which has developed within the last quarter of a century, as the result of an increasing professional unity, is the efficient sanitary regulations, national, State and municipal, that now afford protection to the people from

diseases that were formerly devastating in their effects. It is not necessary in this audience to mention smallpox, cholera, typhoid fever, diphtheria, anthrax, leprosy and the bubonic plague, each of which has been brought under relatively effective control, but I do feel that it is necessary to emphasize the fact that there are many unsolved problems relating to the prevention of disease that stand as a challenge to the industry, the ingenuity and the courage of the profession. While these various changes have taken place, others of almost equal importance are observable in the relations of physicians to society. While the community, instigated by the medical profession, has given to that profession a legal status, definite and increasingly influential, and has given it certain prerogatives and certain exemptions, it has, likewise, hedged it about with certain limitations and imposed upon it certain liabilities. There are numerous laws, both common and statutory—*lex non scripta* and *lex scripta*—that admonish the physician that his conduct carries with it a liability not defined by self-imposed rules, and the numerous courts of our land proclaim that there are tribunals, 'other than his own conscience, to adjudge penalties for carelessness or neglect' on the part of the physician. So numerous, so unjust and so disastrous are actions before such tribunals that they have caused the development of a new, legitimate and beneficent enterprise in the development of a company to insure physicians against malpractice. It may be true that in certain States and localities these laws are unjust, and that there is a grave error in their administration by judges created under our wretched elective system; but if so, the facts only emphasize anew the necessity for more complete organization of the profession and for the more active exertion of its influence upon elections.

THE REORGANIZATION OF THE ASSOCIATION.

This brings us again to a realization of the fact that the results that can be achieved only by the unification of our national profession can not be attained under the present organization of our Association. The disproportionately rapid growth of the *Journal* as compared with that of the Association can have no other significance. The weakness of the Committee on Legislation, at Washington, was a question neither of personnel nor of industry, but arose purely from the fact that there was no efficient organization in the rank and file of the profession by which speedy and effective influence could be brought to bear upon members and senators. Equal difficulty has been encountered in several States where organization has been similarly defective. The demand for more effective organization of the Association has come from all over the country and resulted in the adoption of a motion, at Atlantic City, authorizing the appointment of a committee of three to report a plan of reorganization at this session. Another motion was adopted authorizing the creation of a supplementary committee of one from each State and territory, entitled a Committee on Organization, which has been filled by appointing for the most part the retiring presidents of State societies for the current year. The committee on reorganization, consisting of Dr. J. N. McCormick, Kentucky, Dr. Geo. H. Simmons, of Illinois, and Dr. P. Maxwell Foshay, of Ohio, has given to the important question entrusted to it a most careful and painstaking consideration. It has laid before you the results of its deliberation. In doing so it has emphasized the principle that this Association has its origin in the organized profession of the respective States. It emphasizes the fact that the delegate body should be so small that it can remain in prolonged session and give to the various subjects under consideration that deliberate

attention which has not been possible under the existing scheme of organization during the last forty years. It recognizes the paramount importance of the scientific feature of our work by relieving the general meetings and the sections alike of the troublesome details that now consume the limited and valuable time of the sessions. It remedies the glaring and serious defects in the present constitution. It prepares the Association, by perfecting the organization, to meet important and pressing questions. These considerations, together with the fact that the existing constitutional provision, relative to delay of action on pending amendments, has been met by the appointment, a year ago, of a committee for the avowed and published purpose of reorganization, and by the action of the committee in laying the results of its work before every member of the Association—I say these considerations and these facts prompt me to advise the adoption of the proposed Constitution and By-Laws in their entirety at the present annual session of the Association.

The Committee on Reorganization, under the restrictions of the resolution creating it, has, very properly, left undisturbed the existing rules of conduct. These, if construed to have a fundamental importance, and if vigorously enforced as they now stand, would disintegrate the Association in a single day. This reason, and others already given, confirm me in the conviction that such rules should be either amended or abrogated, or, if reaffirmed, it should be by general resolution endorsing their underlying principles, but disclaiming the present applicability of their details. There are, however, various views entertained upon this subject, and that the matter may be approached in a spirit of tolerance, that it may be discussed coolly and impartially, that a consensus may be reached, and that harmony may be attained, I recommend

that the general questions of the revision of the rules of conduct be referred to a special committee on ethics, consisting of three members, with instructions to report to the legislative body at the next annual session of the Association.

THE NEW SCHOOL OF MEDICINE.

The changes which I have advocated are essential for the attainment of the purposes of the Association and for the fulfillment of the high destiny of our national profession. They are demanded by the changes that have taken place during the last fifty years. The legislative functions have passed from voluntary organizations to the Congress and the Legislatures where they belong; but it still devolves upon the profession in the organized capacity to stimulate, to restrain, or otherwise to control the law-making power. The responsibility of the profession is increased, rather than diminished. Science has come to have a clearer meaning. He who now proclaims a dogma cries alone in the night, while the world sleeps. They who demand a creed may read its varying terms only in the progressive revelation of natural laws. Practice has changed. The depletions, the gross medications, the absurd attenuations, the ridiculous anti-mineralism have given away to a refined pharmacy and to a more rational therapy. Sacrificial surgery has yielded to the spirit of conservatism. Prevention is given precedence over cure. Education implies research and discovery, and all may delve. I proclaim, events proclaim, the existence of a new school of medicine. It is as distinct from the schools of fifty years ago as is the Christian dispensation from its pagan antecedents. It is the product of convergent influences, of diverse antecedent origin. It acknowledges no distinctive title, it heralds no shibboleth. It is a school of human tolerance, of personal independence, of scientific honesty. It is

the slave of neither prejudice nor preconception and abandons the accepted truth of yesterday if only it be the demonstrated error of to-day. It places no premium upon personal prerogative, and extends no recognition to individual authority. It makes no proclamation of completeness, no pretension to sufficiency. It recognizes that truth is undergoing progressive revelation, not ending to-day, but continuing through the ages. It yields its plaudits to achievement, and recognizes that he is the greatest among men who reveals the most of truth unto men. It greets as a friend him who thinks, though he think error, for, thinking, he may think truth and thereby add to the common fund. It heeds all things, examines all things, judges all things.

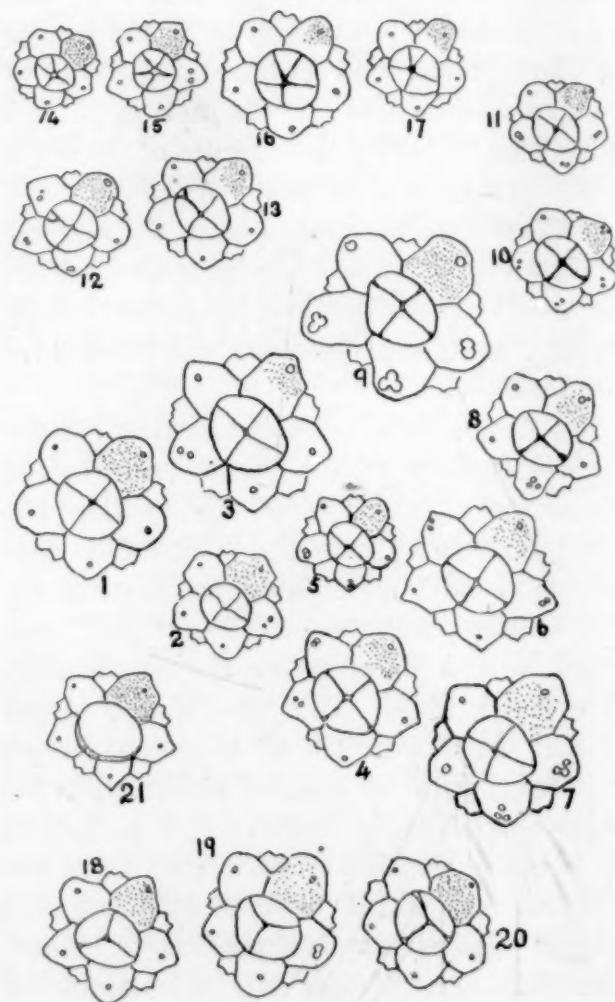
To you, the exponents of this new school, of this new generation, of this new century; to you, representatives of the Democracy of Science; to you, citizens of the Republic of Letters, I extend greetings; and here, in our parliament assembled, here, where our will is supreme, I this day invoke upon our deliberations the spirit of liberty, the spirit of courage, the spirit of progress, the spirit of truth.

CHARLES A. L. REED.

VARIATIONS IN THE APICAL PLATES
OF *ARBACIA PUNCTULATA* FROM
WOOD'S HOLL, MASS.

THE object of this note is to call the attention of naturalists to three points of variation in the apical system of the common eastern sea-urchin, *Arbacia punctulata*. The variations may be already known, but I had not noticed them till a year ago, and have never seen any mention of them in print. The observations are based on the study of sixty-three dry specimens sent me for class use from Wood's Holl, Massachusetts, by Mr. F. W. Walmsley. The different plates can be seen very readily if, after removing the spines, the surface be

washed and gently brushed with a weak solution of caustic potash and then dried. Great care is necessary in handling the anal plates or they will fall out. The drawings were all made under a camera lucida, magnified four diameters and then reduced one-third. The views are all placed in a similar position, *i. e.*, the anterior radius (as defined by Lang's 'Text-Book of Comparative Anatomy') is with the madreporic plate in the right anterior inter-radius. The views are arranged so that all those having four anal plates are in the center and those with three or five are below or above. This figure is a view of the



arrangement of apical plates most frequently found, the 'mode,' as it is called by recent writers on variation. It was selected to represent forty-five cases with

respect to the number of anal plates and genital pores. The other figures all represent different cases, none of them exactly duplicated in the whole collection of sixty-five. In No. 1, the mode, we recognize four anal plates an anterior, a posterior, a right and a left. Five genital plates, meeting by a considerable distance and totally excluding the ocular plates from the border of the anal ring. Each genital plate is perforated by a single genital pore. A study of the cases shows that none of these points are constant.

First, as to the number of anal plates, we find variation between three and five with four as the mode. In the case of those with five plates, two have the fifth very small, barely distinct, and the position of each one of the four large ones is similar to that of the mode. It is interesting to find that the fifth in both of the two cases is introduced at the same point, viz., near the left anterior radius. The position of the plates is nearly constant in the specimens with four, though there is a little shifting usually toward the right. Thus in No. 4, the centers of the anterior and posterior plates are strictly in the axial line, but in No. 7 they are not. In the cases with three plates, the anterior seems to have been the one to disappear, the posterior being present and showing the same tendency to shift as just noted. In the cases with five equal plates, Nos. 14-17, the plates show a tendency to be all of them radial in position, *i. e.*, alternate with the genital plates.

The number of pores in the genital plates is also subject to variation, which occurs in a greater percentage of cases than the preceding. In the mode, No. 1, there is a single genital pore in each genital plate. In No. 2, the right posterior genital plate has two pores, one being smaller. In No. 3, there are two large pores well separated. In No. 19, there is in the right posterior genital plate

a pore imperfectly divided into two; it is the least deviation from the mode in the collection. No. 5 is an interesting case in which in one plate there are two pores nearly separate and in another three, one distinct and the other two fused. In No. 8, one plate has two pores and another three. Three pores is the maximum number that I have found in one plate. In some cases all three pores are united as in No. 9, or one is distinct and two are united as in 7, or all are distinct as in 7, 8, 10. The maximum number of genital plates in one individual thus furnished with extra pores is four (Nos. 10 and 11 and, possibly, 9); in no case are all the genital plates thus varied. As to frequencies, I notice that it is more often that we find two pores than three. No one of the five genital plates is wholly exempt from this division of the genital pore, but the madreporic plate is least frequently variable. I have found two cases in sixty-five in which it had two pores, and one case with three.

Summarizing the facts as to the number of genital pores, we get the following table, in which the number of pores for each plate is shown; thus the upper and left block of figures shows that the left anterior genital plate has one pore in seven cases, two pores in five cases and three in no case, and so on for the remaining four plates:

1111111=7	11111111=9
22222 =5	22 =2
— =0	3 =1
11111 =5	1111 =4
222222 =6	2222222=7
3 =1	3 =1
	11111=5
	222 =3
	3333 =4

The three posterior plates are thus shown to be more variable than the two anterior plates, and the posterior plates show a stronger tendency to having three pores than any of the others. It is interesting to note that in the subcarboniferous sea-

urchin *Melonites* (Lang, '96, ii, p. 291, Macmillan edition; and Dana, '95, Manual of Geology, p. 641) there are four, or in some genital plates five, pores, instead of one, as regularly in modern genera.

The positions of the ocular plates with reference to the border of the anal ring are subject to variation. The facts in the case are these: In a majority of the 65 *Arbacia*s observed the plates are located exactly as shown in Fig. 1, where the madreporic plate meets its two neighbors by a long joint, thus pushing the ocular plate far away from the border of the anal opening, as compared with the left posterior ocular plate, which is only slightly distant from the border. The right posterior ocular and the right anterior are also less separated than the remaining two. This is the mode. The variations from it are on the part of the left posterior ocular chiefly and, in addition, of the right posterior, and less of the left anterior ocular plates. The extreme case of this variation is shown in No. 5, where the left posterior ocular plate participates in the formation of the border of the anal ring, as the right posterior also does, though in a less degree. In No. 21, the same variation is to be seen. Cases in which this form of variation takes place, but in a less extreme degree, are frequently met. No. 17 is such a case; here the left posterior ocular plate barely touches the margin; this is also seen in No. 3. In No. 10 this ocular does not quite reach the margin. The left posterior ocular thus shows a strong tendency to push itself into the anal ring, a tendency shown, too, but in a less degree, by the right posterior ocular and slightly by the left anterior ocular plate. The specimen of *Arbacia*, figured by Brooks in his 'Invertebrate Zoology' ('82, p. 86), which came from Southern waters, shows this same variation as to the left posterior ocular plate. The specimen of *Echinocidaris* (*Arbacia*) *pustulosa*,

figured in Lang ('96, Macmillan, Comp. Anat., II., p. 232), shows the two posterior and the left anterior oculars all bordering the ring.

In some sea-urchins (*e. g.*, *Diadema*) all the oculars take a part equally in forming the boundary of the anal ring. In *Salenia*, believed to be a very primitive genus, none of them touch it. In *Strongylocentrotus* there is a condition between these two extremes; in that form the left posterior ocular and the right posterior ocular regularly form a part of the border of the anal ring, and occasionally the left anterior ocular reaches it. In *Arbacia* the corresponding ocular plates vary in the direction of an arrangement which is the mode in *Strongylocentrotus*. A somewhat extended study of the apical systems of *Arbacia* from widely separated localities, together with a similar study of that of some of the other sea-urchins, would probably be of considerable interest to students of variation.

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January 22, 1901.

INORGANIC FERMENTS.

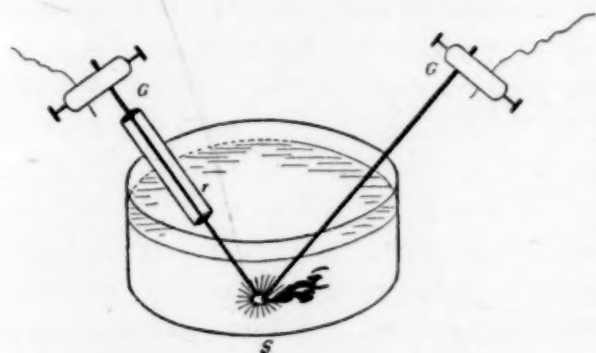
AN article on this subject appeared somewhat more than a year ago in the *Zeitschrift für physikalische Chemie* by Bredig and Müller von Berneck. Quite recently a monograph has been published by Bredig, under this title, containing an account of the experimental work which he has done with others and also an introductory chapter on colloidal solutions, method of preparation, etc.

The monograph begins with a discussion of the general properties of colloidal solutions. Graham found that colloids diffuse very slowly in comparison with crystalloids. Pfeffer showed that colloids exert very small osmotic pressures, and Tammann demonstrated that colloids lower the

vapor-tension of water to only a slight extent.

These facts can be accounted for in two ways, either by assuming that the colloids in solution have very large molecular weights or that colloidal solutions are not true solutions at all, but mechanical mixtures, in which the colloid is in a very fine state of subdivision. The latter view is now generally held for a large number of reasons, and for the metals, at least, seems to be made very probable by the method employed in the preparation of such solutions.

The work of Bredig and his pupils has to do with colloidal solutions of the metals, and the method employed in preparing such solutions is very interesting. Two bars of the metal in question are thrown into the circuit of a suitable electric current, and the lower ends of these poles are immersed in pure water, as shown in the figure. The



ends of the bars of metals, *g, g*, are brought sufficiently near that an arc is established between them beneath the water. The metal is torn off from the bars in such a fine state of division that it forms in the water a colloidal solution.

In such solutions the metal is so finely divided that it cannot be seen under the most powerful microscope, the solution appearing homogeneous under such conditions.

By the above method colloidal solutions of platinum, palladium, iridium, silver, gold and cadmium were prepared. These

solutions had the properties of colloidal solutions in general, and it is quite evident that such solutions are but mechanical mixtures of the very finely divided metals with the solvent, water.

Such solutions of the metals have some quite remarkable properties, and one of these has been studied extensively by Bredig and his pupils.

It was found that colloidal solutions of platinum have the property of decomposing hydrogen dioxide catalytically. A catalyzer is a substance which, in relatively small quantity, can effect a large transformation. The solution of metallic platinum fulfilled this condition, a small amount of the solution decomposing a large amount of hydrogen dioxide. Bredig states that a gram, atomic weight of platinum in 70,000,000 litres of water can appreciably accelerate the velocity of the decomposition of hydrogen dioxide.

Further, in order that a substance may act catalytically, it must apparently not take part in the reaction which it produces, and must remain in an unaltered condition after the reaction is over. The colloidal solution of platinum also fulfilled this condition. Bredig has shown from a study of the velocity of the reaction, by a well-known method, that the decomposition of hydrogen dioxide by the finely divided platinum is a monomolecular reaction; *i. e.*, only one substance—the hydrogen dioxide—takes part in the reaction. The metallic platinum, therefore, does not enter into the reaction at all, but remains unchanged in the solution.

We now come to the most important part of the paper. The author sees an *analogy between the catalytic action of the colloidal platinum and the action of organic ferments*. They point out that recent work has shown that there are many reactions which are effected by both unorganized and organized ferments, and also by the contact

action of many metals and oxides of the metals. A few such reactions will be given :

Alcohol is oxidized to acetic acid by the oxygen of the air, both by the ferment *mycoderma aceti*, and by finely divided platinum. Calcium formate is decomposed into calcium carbonate, carbon dioxide and hydrogen, not only by certain bacteria, but also by finely divided iridium, rhodium and ruthenium. Dilute solutions of oxalic acid are decomposed by palladium platinum and silver sponge, and also by certain fungi, and the list of such reactions could be very greatly extended. From this it is obvious that analogies between the action of finely divided metals and organic ferments were not entirely wanting when the work under review was begun.

Bredig then attempted to determine how close these apparent analogies really are, by studying very carefully and thoroughly the decomposition of hydrogen dioxide by finely divided platinum.

It has already been pointed out that a very small amount of platinum can decompose a large amount of hydrogen dioxide, just as a small amount of a ferment can effect a large amount of chemical transformation.

It has also been shown that the finely divided platinum does not enter into the reaction, just as a ferment does not enter as such into the reaction.

The presence of electrolytes affects the colloidal condition of the platinum, and, consequently, its activity. They have the same influence on ferments.

But the most striking analogy between the action of these colloidal solutions of the metals and organic ferments is to be found in their conduct in the presence of certain poisonous substances.

Bredig and Reinders showed that hydrogen sulphide in very small quantity, can diminish the catalytic action of the finely divided metal. An alkaline solution, con-

taining one gram-atomic weight of sulphur in *ten million litres* of water, can produce an appreciable diminution in the catalytic action of the metal. Schönbein has shown that small quantities of hydrogen sulphide can appreciably diminish the action of organic ferments on hydrogen dioxide.

Bredig and von Berneck have shown that hydrocyanic acid has a remarkable influence on the catalytic action of platinum. Thus, one gram-molecular weight of hydrocyanic acid in *twenty million litres* of water diminishes to one-half the velocity of the decomposition of hydrogen dioxide by colloidal platinum. This again is strikingly analogous to the action of hydrocyanic acid on organic ferments. Schönbein showed that very small quantities of hydrocyanic acid very materially lessen the action of all organic substances which decompose hydrogen dioxide catalytically ; and quite recently Buchner has shown that hydrocyanic acid diminishes the action of the 'pressed juice' of yeast on hydrogen dioxide and on other substances.

The 'poisonous' action of a number of other substances, such as bromine, iodine, analine, arsene, arsenious acid, phosphene, phosphorus, carbon monoxide, oxalic acid, mercuric chloride, etc., on the colloidal platinum and on organic ferments was studied, with the result that a general analogy between the two was undoubtedly shown to exist.

The conclusion reached by Bredig as the result of this work can best be stated in his own words :

"All these facts point to an unmistakable analogy between the contact actions in the inorganic world, and the actions of ferments in the organic world. As, in the case of my colloidal catalyzers, we are dealing with reactions in which enormously developed surfaces are involved, so is it probable that the same condition obtains in the actions of ferments, enzymes,

blood corpuscles, and oxidizing and catalyzing organic substances. We see, therefore, that the organism develops its enormous surfaces in the tissues and colloidal ferments not only because it requires osmotic processes, but on account of the very great catalytic activity of such surfaces. If, as Boltzmann says, the war for existence which living matter must wage is a war about free energy, certainly, of all the forms of free energy the *free energy of surface* is the most important for the organism.

"In conclusion, I need scarcely state that I do not maintain that there is any mysterious identity between the metals and the enzymes. But, without exaggerating the overwhelmingly large number of analogies, we are compelled to regard the colloidal solutions of the metals, in many relations at least, as *inorganic models of the organic enzymes*."

HARRY C. JONES.

SCIENTIFIC BOOKS.

Electric Lighting. By FRANCIS B. CROCKER, E.M., PH.D., Professor of Electrical Engineering in Columbia University, N. Y., and Past President of the American Institute of Electrical Engineers. New York, D. Van Nostrand Co.; London, E. & F. N. Spon.

This book is the second volume of a work, the earlier of which appeared in 1896. The complete work is intended to be a practical treatise on electric lighting for engineers, students and others. The prior volume dealt mainly with the establishment and equipment of electric lighting stations, including locations, buildings, power, dynamos, accumulators, switchboards, measuring instruments, lightning arresters, etc. The present volume, on the other hand, is devoted to that part of an electric light installation which includes the distribution of current and its utilization in various forms of lamps for light. As the author points out in his preface, the space available would not permit the more abstruse consideration of the several divisions of the subject, and this may well be admitted. A glance shows, in-

deed, that the volume has no waste space; the descriptions are brief, and the data compact and apparently quite accurate. In these respects it is excellent.

The book is eminently practical, but does not neglect the full consideration of principles necessary to a full understanding of the topics treated. It will be valuable as a reference book for engineers on account of the inclusion within its pages of many useful tables and examples.

Beginning with a chapter upon the physical properties of conductors, which includes the application, under limitations and modifications, of the so-called Kelvin's law, and the maximum carrying capacity, there follows a thoroughly adequate treatment of the various systems of electrical distribution in several succeeding chapters. The series systems, parallel systems, three-wire and five-wire distribution, direct current transformer systems and networks of electrical conductors, share the space allotted, in accordance with their importance in actual practice.

Chapters VII. and VIII. contain brief, but very lucid, expositions of the principles of alternating currents and polyphase currents respectively, after which follows a chapter devoted to a similar treatment of that very important adjunct, the alternating current transformer. The two succeeding chapters relate to alternating current systems of distribution and the calculation of such circuits. The matter appears to be well put together, and is amply elucidated by diagrams. The part of the work devoted to the distribution of delivery of energy to the place desired is concluded by a full and judicious consideration of overhead and underground conductors. Here may be found ample details of line construction, conduits, etc., as exemplified in the most recent construction, particularly in America.

The remaining portion of the volume proper is devoted to the utilization of the energy for lighting, as in arc lamps and in incandescent lamps, in addition to the accompanying interior wiring, and electric meters. The work concludes with appendices, one of which contains the National Electric Code of the Board of Fire Underwriters, and the report of the Committee

of the American Institute of Electrical Engineers on Standardization. The inclusion of this matter is certainly to be commended, and it increases the value of an already valuable technical treatise.

The chapters on electric arcs and arc lamps will be found to embody the later knowledge and developments, such as have only appeared in separate scientific papers or technical publications. Likewise the section on incandescent lamps is fully modern, as could not fail to be the case, as it has been revised by Mr. John W. Howell, whose authority on the subject is beyond dispute.

The work has so much calling for commendation that it would be surprising if a few slips of the pen did not occur. In dealing with such a large amount of technical matter it is difficult to avoid occasional use of phrases a little crude, but if the meaning is clear no harm is done. Exception may be taken to some things stated as facts, which are still undetermined. For example, on page 322, 'the retention of the heat by the bulb' in inclosed arcs is involved to save this type of arc from inefficiency as compared with the open air arc. Also, just following, it is stated that "Evidently a large bulb will be less efficient than a small one and will also tend to produce a carbon deposit by chilling the vapor on its cooler surface." This involves the inadmissible idea that carbon vapor can exist away from the arc flame as such, when in fact carbon would be condensed as soot unless burned before leaving the arc flame. If we deprive the inclosed arc too completely of air a small bulb is more rapidly rendered opaque by soot deposits than a large one.

There is a manifest inconsistency seen in comparing paragraph headed 'Current and Voltage,' page 312, with paragraph 'Efficiency,' page 325. Here the inclosed arc is made to appear by tests accredited to Freedman, at least as efficient as the open air arc, in contradiction to the opening sentence under 'Efficiency,' page 322. The fact is that there are other measurements of arcs extant which are far less favorable to the inclosed arc than those used in the book, and the former are probably nearer the truth.

The author has, in several instances, wisely

availed himself of publications issued by the manufacturing companies, and many chapters are followed by references to papers and publications which have been consulted, though the chapters dealing with arcs and arc lamps are an exception. This brings to notice what may appear to some as a defect of the work. It is evidently not intended to be historical, yet names and sometimes dates are used, but there appears throughout no consistent policy in that respect. Names occur sometimes in connection with relatively unimportant suggestions, though in other more important connections they are omitted. Credit is even given, sometimes, to the same worker for certain things and withheld at other times, though the objects in the latter case may be of the greater practical value. Few instances appear to exist in which the credit given is misplaced, as with the transformer figured on page 174. Notwithstanding this, the work gives ample evidence of the ability and industry of its author, and must be welcomed as a valuable addition to electrical literature. It is well printed, admirably illustrated, and the figures are clear and well chosen.

ELIHU THOMSON.

Chemical Technology. Edited by E. CHARLES GROVES and WILLIAM THORP. Vol. III. *Gas Lighting*, by CHARLES HUNT. Published by P. Blakiston's Son & Co., Philadelphia. Large 8vo. Pp. 312. Price \$3.50.

This work deals very fully and satisfactorily with the manufacture of gas for the purposes of illumination, the various forms of retorts, settings, condensers, scrubbers, governors, etc., being carefully and minutely considered. The methods of chemically testing and measuring the gas are clearly and concisely explained.

More than one-eighth of the book is devoted to oil and water gas, nearly every important process for their manufacture being detailed. The treatise closes with an excellent chapter on burners, all the principal ones being described; no mention is made of the 'bec Feron,' a French mantle burner of high power using a mixture of gas and air under pressure.

In view of the extended use of inclined retorts, the reviewer considers the treatment of this subject too brief; this remark applies also

with even more force to the topic of acetylene. Strangely enough, no directions are given for the photometric testing of gas (save for street testing), so that for this important measurement recourse must be had to another book. From a typographical standpoint too, the book leaves something to be desired; several of the cuts, for example, Figs. 43, 204, 207 and 211, are not clear.

The work in the main is excellent and should be in the library of every one interested in the subject of gas.

AUGUSTUS H. GILL.

Lehrbuch der vergleichenden Anatomie der Wirbellosen Thiere. Von ARNOLD LANG. 2te Aufl. 1ste lief. bearbeitet von DR. KARL HESCHLER. Jena, Gustav Fischer. 1900. Pp. viii + 509, mit 410 abb.

In this volume is included the molluscan part of Lang's well-known and useful work, enlarged, revised and additionally illustrated.

The difference between the original or the excellent translation of Bernard (Macmillan, 1896, pp. 283, ill. 222) is not so great as the figures seem to imply, and is largely accounted for by the increased size of the type and the addition of 188 new cuts. A brief summary of the chief additions may be useful.

In the 'systematic review' we find the sequence of the orders changed in the Gastropods, and, in the Pelecypods, a number of suborders introduced; while the unnatural and illogical orders of the Pelseneerian classification, and his jumbled-up collocations of families under them, are still retained, though a synopsis of later views is included. In the review of 'superficial organization' the Amphineura are recognized as a class and a short chapter on the Cephalopod shell is added.

Under 'pallial complex,' reference is made to the discovery of gills in certain fresh-water pulmonates which is further enlarged on under 'Respiration,' and the characters of the Janelidæ, not referred to in the first edition, are discussed. The chapter on respiration is enlarged and a general summary appended.

A few remarks on *Spirula* are added under 'Musculature,' and under 'Asymmetry' new information is added and the author's theory

discussed in the light thus thrown on the subject, with a reference to the bibliography for the opinions of others on this topic.

The phosphorescent organs form the subject of an appendix to the 'sensory organs,' and, under 'alimentary canal,' additional information is given on the proboscis in *Conus*, *Terebra*, *Cassis*, *Dolium* and *Pyrula*.

The general discussion on the intestinal region, stomach and hepatic glands is somewhat enlarged. The asserted absence of endothelial investment in the alimentary canal and digestive glands is alluded to, and the general discussion of the nephridia has been enlarged.

Under 'Reproductive Organs' we find additional matter in the general discussion, and also relating to the Ascoglossa and Holohepatia, among the Nudibranchs, and the Stylommato-phora among the pulmonates.

The chapter on the 'Parasitic Gastropods' has been expanded and notes on *Thyca* and *Mucronalia* added.

Under 'Ontogeny' we note additions in connection with *Ischnochiton*, *Vivipara*, *Limax*, *Dreissensia*, *Yoldia* and *Loligo*, and the entire portion relating to Cephalopoda seems to have undergone amplification and revision. Much-improved indices and enlarged bibliography are subjects for gratitude.

The summary of facts in relation to molluscan anatomy included in this work is rich, and may be consulted with profit by those interested, though entering less into detail than the work of Simroth in the new edition of Bronn's 'Thierreichs' which is not yet complete.

Whether the training which most anatomists get is of a kind which impairs their faculties for generalization is a question difficult to answer; but it is certain that most of the younger contributors to anatomy in mollusks have not much advanced the science by their simultaneous hypotheses bearing on classification. The cause seems to be that they do not realize the vastness of the untrodden field in the molluscan subkingdom and generalize on too limited data. Furthermore, other animals are often so much easier to handle and require so much less labor in investigation to afford tangible results, that it is not remarkable that most instructors turn to animals of smaller size and simpler organi-

zation to obtain subjects for their pupils; and consequently the neglect of the mollusca continues.

The work of Lang might have advantageously been supplemented by a chapter calling attention to the gaps in our knowledge and emphasizing the need of research and the rewards which will undoubtedly fall to the lot of him who decides to investigate patiently in a field where not one in a thousand species is anatomically known, and where a careful embryological study, as of the development of the gills in Pelecypods, will produce the most far-reaching results, if carried out with thoroughness.

When this student appears, he will find in the work of Lang a storehouse of facts and a record of hypotheses which cannot fail to be of the greatest service in his studies.

W. H. DALL.

Clays of New York, their Properties and Uses.

By HEINRICH RIES. Bulletin of the N. Y. State Museum, No. 35. Vol. 7. 1900. Pp. 450. Plates, 140.

Somewhat over ten years ago, the author of the work before us took up the study of the clays of the Hudson River region and the industries based upon them. The venture had all the charm of novelty, because up to that time it had not occurred to anyone to investigate these humble resources, which had apparently impressed all observers as possessing little of interest or of importance. And yet the investigation proved that the clays of the state were the raw material of the most important of all its mineral industries, and they had evidently been passed by, because of their ordinary and simple nature, because they did not appeal to the imagination. The experience is not unique, as will be seen from the following incident. While the writer was recently discussing the subject with a Russian friend, the latter remarked that he had discovered on the steppes, extensive deposits of china-clay, which, when worked up and sold, would bring \$150.00 per ton. He had great difficulty in arousing interest, and yet had he found in any such quantity, gold ore worth \$5.00 or \$10.00 per ton the greatest excitement would have immediately broken out.

Ten years ago in America, scientific interest in clays was chiefly limited to those which supplied refractory materials. Our literature was small. The New Jersey Geological Survey prepared a valuable report in 1878, and in the later eighties the Geological Survey of Ohio published an important contribution, both reports being issued by States where the fire-brick industry was and is important, but except for these two contributions almost no attention had been elsewhere paid to clays by official scientific bodies. Conditions have greatly changed since then; the vitrified brick industry has sprung up; shales, once the most despised and neglected of rocks, are now utilized in enormous quantity; clays are purified and washed, and the ceramic arts have made great strides. It is but just to Dr. Ries to say that his writings have contributed in no small degree to the result and have brought within the reach of workers and readers alike, the possibilities of this invaluable raw material.

The present work is his most extensive contribution. To estimate it properly, it must be appreciated that it is intended as much for the practical workers as for the libraries and laboratories of institutions of learning. The balancing of theoretical investigations with descriptive matter has therefore been necessarily considered with care by the author, but it has been performed with discretion and in a way to attain the most useful result. The scientific reader, however, will be glad to know that all the author's results in the investigation of the physical properties of clays have not yet been published and that further contributions may be expected.

The work opens with the generalities of clays; their origin; mineralogy; properties; analysis; classification; geologic distribution in New York and in the United States.

The methods of digging clay and the geologic features of the deposits are then described, after which the brickmaking industry receives detailed description. This is followed by terra cotta, roofing tile, sewer pipe, hollow brick, etc.; floor tile, decorative tile, fire clays and pottery; each of which topics is treated at length. The properties and uses of shales are next taken up and with them feldspar is placed

as a sub-topic, somewhat illogically as it would seem.

Many minor uses of clays, as in cements, paints, paper-filling, road-materials, etc., are next reviewed, and then the various tests of different clay products are described as an aid to the practical worker. An extensive compilation of clay analyses, an excellent bibliography and a directory of clay workers in New York State conclude the bulletin.

The book is encyclopedic in treatment and will prove a valuable work of reference not only within but without the State.

J. F. KEMP.

COLUMBIA UNIVERSITY.

SCIENTIFIC JOURNALS AND ARTICLES.

THE first number has been issued of *Kirchhoff's Technische Blätter*, a weekly periodical not intended for popular reading, but having for its purpose the accurate rendition of scientific and technical matter. The idea of its editor and publisher is to supply these 'leaves' not only to individual subscribers but, and principally, to the subscribers to the newspapers, as supplements to regular issues. By this plan the newspaper is able to offer its readers popular but scientifically correct accounts of current progress and advances in technical departments, written by scientific men of recognized standing and often without appreciable additional expense. The list of already promised contributions includes articles by a large proportion of the leading scientific men of Germany and many in other countries. The first number contains, for example, articles on the Berlin-Cologne electric railway by Arthur Kirchhoff, on metallurgical work by Dr. Wedding, on his flying machine by Hofmann, on the steam-turbine by Professor Kubler, and a variety of other interesting matter, well condensed as also well selected. The enterprise is a novel one and deserves success. One would think that such a plan would prove practicable in the United States, more than in Europe; since many of our newspapers, notably the *New York Sun* and the *Times*, have long owed something of their reputation to their interest in, and accuracy of statement

regarding, scientific and technical matters. Like the new German periodical, they have secured their information from experts familiar with the subjects discussed and competent not only to present a clear and concise account of a scientific or technical advance, but also to advise regarding the importance of the matter and the advisability of giving it space. Fads and frauds and follies are thus avoided.

R. H. T.

The American Naturalist for May begins with an account of 'Two New Myrmecophilous Genera of Aberrant Phoridae from Texas,' by Charles T. Bruce, these being wingless Diptera of a family before unknown in America. L. B. Walton discusses 'The Metathoracic Pterygota of the Hexapoda and their Relation to the Wings,' concluding that the typical thoracic segment possesses the components of both pterygodum and wing, and Vernon L. Kellogg considers 'Phagocytosis in the Postembryonic Development of the Diptera.' H. S. Jennings has a paper 'On the Significance of the Spiral Swimming of Organisms,' considering that by means of this many creatures, even those not symmetrical, are enabled to pursue what in the main is a straight course. The 'Synopsis of North American Invertebrates' contains the second part of the *Hydromedusae*, by Chas. W. Hargitt. The 'Reviews of Recent Literature' are unusually numerous, occupying nearly 40 pages.

The Plant World for May contains the final part of 'Hints on Herborizing,' by A. H. Curtiss; 'The Asparagus Rust,' by Byron D. Halstead, and many briefer articles, notes on current literature and reviews. In the 'Families of Flowering Plants,' Charles L. Pollard treats a number of families of the Rosales.

The Journal of the Boston Society of Medical Sciences for April 23, contains 'A Contribution to the Normal Histology and Pathology of the Hemolymph Glands,' by A. S. Warthin; a second paper on 'The Relation between Physique and Mental Work,' by Henry G. Beyer, in which additional evidence is adduced to show that, as a rule, physical and mental ability go hand in hand, and an article on 'Typhoid

Cholecytitis with Observations on Gall Stone Formation,' by J. H. Pratt.

The Popular Science Monthly for June opens with a timely article on 'Our Forest Reservations,' by J. W. Toumey, in which the subject is discussed from various points of view. David Starr Jordan presents the second instalment of 'The Blood of the Nation,' showing how the slaughter of the flower of the nation in war contributes to the survival of the unfit, and Robert H. Thurston gives the concluding portion of his paper on 'Progress and Tendency of Mechanical Engineering in the Nineteenth Century.' Jas. Lewis Howe discusses 'The Periodic Law,' and Henry A. Rowland's 'A Plea for Pure Science,' is republished as a tribute to his memory, while Gary N. Calkins treats at some length of 'The Malaria Germ and Allied Forms of Sporozoa.' Francis H. Herrick has a well-illustrated article on 'The Wild Bird at Arm's Length; A New Method of Bird Study,' this consisting in removing the branch to which a nest with young birds is attached to some accessible spot near by a green tent, from which the birds are observed and photographed at a short distance. The final article is the sixth portion of 'A Study of British Genius,' by Havelock Ellis, this being devoted to marriage and family.

Bird-Lore for May-June opens with an article by John Burroughs on 'A Bewildered Phoebe,' followed by 'Bird-Nesting with Burroughs,' by Frank M. Chapman, well illustrated from photographs. Annie Trumbull Slosson contributes 'A Sudden Friendship,' showing how tame wild birds may suddenly become. The fourth series of 'Birds and Seasons' treats of the forms to be observed from Boston to Stockton, Cal., incidentally including the statement that Dr. W. L. Ralph is to continue the 'Life Histories of North American Birds' which was begun by the late Major Bendire. Among the various articles in the different 'departments' is one of special interest entitled 'A Connecticut Game Preserve,' by Willard G. Van Name, which hints at a successful method of increasing the birds by making a reservation where they are protected at all seasons and fed during winter and whence they spread into adjacent territory.

SOCIETIES AND ACADEMIES.

THE NEW YORK SECTION OF THE AMERICAN CHEMICAL SOCIETY.

THE regular meeting of the New York Section of the American Chemical Society was held May 10th, at the Chemists' Club, 108 West 55th Street, Dr. C. A. Doremus presiding.

The following papers were read:

'The Quantitative Determination of Cadmium,' by E. H. Miller and R. W. Page.

'On the Relation of Chemical Constitution to the Physiological Action of Certain Modern Anæsthetics,' by W. E. Dreyfus.

'Alloys of Titanium and Titanium Steel' by A. J. Rossi.

(a) 'Chemical Nature of the Enzymes,' (b) 'Note on Nucleic Acid,' by P. A. Levene, read by Dr. S. Bookman.

'Analysis of Garden Sage, with Notes on the Determination of Essential Oils,' by L. L. Watters.

Each of the papers received some discussion.

A communication was read from the chairman of the New York Section of Chemical Industry, relative to the appointment by that body of a committee to secure 'uniformity in technical analysis'; and stating that a subcommittee had been appointed to investigate the analysis of Portland Cement. Also that work on this line had commenced and that members of the New York Section of the American Chemical Society were invited to co-operate.

It was moved and seconded that the matters be brought before the council with the recommendation that a committee be appointed to cooperate with the committee of the Society of Chemical Industry.

It was also voted that the chairman of the New York Section be returned as a local delegate to the council of the Society, provided he be not already a member of the council as delegate-at-large.

DURAND WOODMAN,
Secretary.

DISCUSSION AND CORRESPONDENCE.

THE MOTION OF A TOP.

THE elementary explanations of this motion generally labor under the difficulty which attended the explanations of the late Professor Pliny Earle Chase, that is, they need an ex-

planation. Such a result might be expected when we consider the difficulties of the question. The student should understand that he must face the difficulties, and that he can not overcome them without serious study. A good analytical exposition will be found in the 'Mecanique' of Poisson. But the most satisfactory investigation of such motions is given by Poincot, by means of the theory of couples. An interesting example is that of the precession and nutation of the equinoxes. If we form the couples around the earth's axis of rotation, around the line of equinoxes, and around the line in the earth's equator, directed toward the solstice; we find that the couple around the axis of rotation is zero; the couple around the line of equinoxes gives the precession; and the couple around the other axis produces the nutation. By substituting the force arising from the action of the sun, expanding by the binomial theorem, and retaining only the first terms, the solar precession comes out $15''.6$ in a year. The calculation for the moon is not so easy because the moon does not move in the ecliptic; but, since we can compound couples like forces, there is no difficulty except the length of the work. The precession produced by the moon is $34''.8$; hence the sum, or the luni-solar precession is $50''.4$. Observation gives $50''.35$; this simple method therefore gives a good approximation to the true value.

The mass of the earth disappears when we compound the couples, and the precession would be the same if the earth were a shell of the same figure. The precession has a secular character, since when we integrate we find a constant factor multiplied by the time. Again, since the precession is negative, the dynamical result shows that the earth is flattened at the poles, and not elongated as Cassini thought.

The nutation can be found in the same way from the couple around the third axis, but it has a periodical character, and changes sign with the longitude of the moon. The computed value agrees well with observation.

Poincot's work is a remarkable example of what can be done by the careful study and examination of the geometrical conditions of a question.

A. HALL.

CAMBRIDGE, May 31, 1901.

MODULUS OF CONSTANT CROSS SECTION.

TO THE EDITOR OF SCIENCE: In the last number of SCIENCE there appears a short article with the above heading, in which the author says he can find no mention anywhere of a modulus of constant cross section. The modulus here referred to will be found in a number of treatises on elasticity, among others the article 'Elasticity,' in 'Encyclopædia Britannica,' Vol. VII., p. 807, and Rankine's 'Applied Mechanics,' p. 279, where a numerical value is quoted for brass. If k be the volume modulus and n the rigidity modulus the modulus for constant cross section is $k + \frac{1}{3}n$.

The author may profit by the study of the thermodynamics of elasticity as given in the 'Britannica' article.

THOMAS GRAY.

ROSE POLYTECHNIC INSTITUTE,

May 27, 1901.

NOTE ON THE GENUS HOLLANDIA OF KARSCH.

IN reading over the sixth volume of the Cambridge Natural History (Insects) by Dr. David Sharp, p. 396, the writer notes the following statement: "The tropical African Arbelidæ are considered by Karsch to be a distinct family, Hollandiidae."

Upon looking up the matter I discover that Dr. F. Karsch, in the twenty-second volume of the 'Entomologische Nachrichten' (1896), p. 137, erected a genus in honor of Dr. W. J. Holland, of Pittsburgh, calling it *Hollandia*, and selecting as the type of the genus the species named and described by him as *Hollandia togoica*. He further made this genus the type of a new family, the *Hollandiidae*, to which he referred the genera *Hollandia* Karsch, *Arbelodes* Karsch, *Lebedodes* Holland, and *Metarbela* Holland.

Dr. Karsch unfortunately overlooked the fact that in the *Annals and Magazine of Natural History* for October, 1892 (p. 295), Dr. Arthur G. Butler had already described a genus of African moths, naming it *Hollandia*, in honor of the same gentleman, whom Dr. Karsch states it to be his wish to recognize. Dr. Karsch's name, therefore, falls into the list of synonyms together with the family name, which he has proposed.

The writer suggests for the genus described

by Karsch the name *Hollandella*. I am, like Dr. Sharp, unable to recognize characters of family value, and the distinction between the group, typified by the genus in question, and the generally recognized constituents of the family Arbelidæ appears to me to be of not more than subfamily importance. From this standpoint the nomenclature would be as follows: Family Arbelidæ, subfamily *Hollandellinæ*, genus *Hollandella*, etc.

I imagine that the change which I propose will not be displeasing either to Dr. Karsch, the learned custodian of the Royal Museum of Natural History in Berlin, or to my friend the Director of the Carnegie Museum.

THEO. GILL.

WASHINGTON, May. 1901.

CURRENT NOTES ON PHYSIOGRAPHY.

U. S. GEOLOGIC FOLIOS.

THE folios of the Geologic Atlas of the United States continue to furnish an unrivaled source of physiographic as well as of geologic information. Among the more recent, the following may be noted: The Monterey folio (Va., W. Va., Darton) exhibits the crowded Appalachians bordering the Allegheny plateau, a district of strongly corrugated strata now reduced to ridges and valleys of anticlinal, synclinal and monoclinal structure. Bristol (Va., Tenn., Campbell) includes a monoclinal belt with many overthrust faults, characteristic of the Appalachians in Tennessee; the mountains here are nearly rectilinear, in contrast to the sharp-turning zigzags further northeast. Between the mountains is an open country with many low ridges, once a lowland, but now dissected after a gently slanting uplift. Standingstone (Tenn., Campbell) presents a portion of the Cumberland plateau, with its ragged western escarpment descending to the 'highlands,' themselves dissected by streams that go to the lowlands next west. Uvalde (Tex., Vaughan) contains a part of the Rio Grande plain bordering the Edwards plateau whose dissected escarpment appears on the north. The plateau has yielded sand and silt with which the broad valleys of the plain are washed; here the streams frequently disappear and reappear, the Nueces river being an unusually large example

of this kind. Elmore (Col., Hills) shows the broad Plains that front the Rocky mountains near Trinidad to be surfaces of denudation, remnants of the removed strata being preserved under the lavas of Raton mesa; the Plains are now somewhat trenched by the streams. Fort Benton (Mont., Weed) gives another illustration of the great denudation by which the Plains have been formed, as testified to by the isolation of the Highwood mountains, an embossed body of dissected lavas and dikes; the larger river valleys of to-day are here sharply sunk beneath the Plains. Little Belt (Mont., Weed) affords an excellent illustration of the topographic consequences of the Neocene warping, for the modern deposits of Smith river basin (described as lacustrine, although consisting of irregularly bedded sands and loose conglomerates) overlap unconformably upon both the denuded central and marginal rocks of the greater Laramie deformation. Like the Highwood mountains, south of Fort Benton, the Crazy mountains, a network of dikes, here testify to the great erosion of the Plains that they overlook. Absaroka (Wyo., Hague) is characterized by the superb dissection of a high plateau of lavas and volcanic breccias; the whole region has been glaciated, and some of the valleys heading in great cirques seem to show glacial scouring in their smooth-sided, trough-like forms. Tacoma (Wash., Willis and Smith) includes examples of channels of ancient glaciers between uplands largely composed of drift; the channels now being invaded by the sea from without and by alluvium from within; the sounds are thus explained by retreat of the ice and not by depression of the land. Mother-Lode (Cal., Ransome) exhibits parts of the uplifted and dissected peneplain of the Sierra Nevada: it was strewn with gravels and flooded with lavas and volcanic conglomerates before uplift; it is now trenched by canyon-valleys. A few eminences surmount the uplands; several lava-capped table mountains standing up with long even-crested tops between the valleys.

RIVERS OF EAST YORKSHIRE.

THE subject of the Sedgwick essay announced by Cambridge University for 1900 was on the dependence of water-courses upon geological

structure, with the stipulation that the area studied should be British. The prize for the best essay was awarded to F. R. Cowper Reed, of Trinity College, who wrote on 'The Geological History of the Rivers of East Yorkshire' (London, Clay and Sons, 1901, 103 pp., map, 8 cuts). Thirty pages are given to a geological history of the region. River development began with the post-Cretaceous uplift and continued through a first cycle with important adjustments till an extensive peneplain had been formed. Near the close of Oligocene time came another uplift, affecting the British Isles and Western Europe. The rivers of the peneplain were thus revived and set to work sculpturing the existent topography; and at this time it is believed that a flat anticline was formed along the axis of the moorland north of the vale of Pickering, producing important changes in certain stream courses. A depression of moderate amount occurred near the end of the Pliocene; the area of greatest sinking then came to be occupied by the North sea, whose extent has since been increased by wave work along the shore. Then came the glacial period and its changes of level, when many valleys were clogged with till and many streams were reversed by ice blockades. Since the ice retreated, a small uplift and a small depression have occurred. The development of river courses is followed through these various land movements, special attention being given to the changes caused by the growth of subsequent branches along belts of weak strata, and by till and ice barriers. The essay is easily the most detailed and successful study of the rivers of northern England that has yet appeared.

THE VOGTLAND.

A DISTRICT of uplands and valleys, drained chiefly by the Elster, roughly located as in the southwest corner of Saxony, and known as the Vogtland, has been described by Wohlrab ('Das Vogtland als geographisches Individuum,' *Forsch. deut. Landes u. Volkeskunde*, XII., 1899, 101-185, map and plates). The essay is interesting as a partial recognition of the necessity of treating geographical forms with respect to their origin, yet it is hampered by the retention of certain traditional empirical methods and

by the incomplete adoption of more modern rational methods. The gently undulating uplands of schists, surmounted by low ridges and knobs of harder rocks, are properly presented as a worn-down old-mountain surface; but the descriptions of its landscapes thus considered are all quoted, as if the author wished to leave to others the responsibility of so venturesome an explanation. No explicit mention is made of the slanting uplift of the region, whereby its streams were enabled to incise their modern valleys. Indeed, the occurrence of bold and rocky valley sides beneath the milder scenery of the rolling uplands is presented as if it were somewhat out of the order of nature, worthy of being looked on as a curiosity, instead of the well-understood and commonplace accompaniment of dissection recently revived by uplift after a long period of relative quiescence. The details of valley form are incompletely described, though incidental mention is made of the incipient flood plains on the convex banks of the meandering streams, opposite the steep valley slopes over the concave banks. Many arithmetical details are given concerning the form of ridges and valleys: for example, the mean slopes of many valleys are calculated; although when the upper course of a valley is shallow and broad, slightly depressed beneath the uplands, while the lower course is sharply incised, relatively narrow and steep-sided, it is as inappropriate to measure its mean slope as it would be to average the price of old scrap iron and new steel rails. All these details have a certain value, but their value would be greatly increased if a more thorough scheme of physiographic description served as the basis of the work.

W. M. DAVIS.

NOTES ON OCEANOGRAPHY.

AN OCEANOGRAPHICAL MUSEUM.

IN connection with the exhibit of the collections made by the Prince of Monaco at the Paris Exposition, a convenient summary of his scientific work has been published by Richard (Les Campagnes Scientifiques de S. A. S. le Prince Albert Ier de Monaco, 1900). Brief descriptions of the different vessels and types of apparatus employed during the voyages, and a more

detailed résumé of the results, are given. Of particular interest in the contents of the pamphlet is the account of the magnificent building which is now nearing completion on the rock of Monaco, and intended to contain the great zoological and other collections of the Prince. The foundation stone was laid on April 25, 1899, by the Emperor of Germany. An idea of the size of the structure may be had from the fact that the façade will have the length of one hundred meters. While the greater part of the exhibits will relate to the biological sciences, there will be considerable space given to the illustration of apparatus, of the physical conditions of life in the sea, and of the areal and bathymetric distribution of organisms, by means of charts, diagrams, photographs, water-color sketches, etc. Appended to Richard's work is a valuable bibliography of the publications of the Prince and of his collaborators on the collections of the 'Hirondelle' and the 'Princesse Alice.'

MARINE CURRENTS AND RIVER DEFLECTION.

THE cause of the strong left-hand deflection of the Mississippi River below Baton Rouge has long been a matter of discussion (Fig. 1). The decided asymmetry of the delta both above and below sea level is an associated problem. Wind



FIG. 1. The delta of the Mississippi. Cross-lining indicates older land. The arrow shows the general direction of the marine current prevailing at the river mouths.

direction, the influence of the Red River and crustal warping have been in turn appealed to in explanation of the facts. The formerly credited clockwise movement of the Gulf Stream in the Gulf of Mexico has likewise been held responsible. It is now generally agreed, however,

that the prevailing direction of current movement is really westward past the mouths of the river. Haskell proved this by the use of the current meter on board the *Blake*. Lindenkohl's chart of densities plainly shows a transference of Mississippi water toward the west as it spreads out over the Gulf. The cause of the current is indicated in the prevailing easterly winds, as charted, for example, in the new Meteorological Atlas of Bartholomew. Cortbell has noted a maximum speed of three knots for the west-flowing current.

In view of such strong and accumulating evidence for the current, it becomes of interest to inquire as to its influence on the form of the delta. The presentation of the case may suffice to call attention to a possible kind of interaction between river current and ocean current in the development of a very definite type of form.

Outside the river-bars, aggradation of the sea floor is progressing more rapidly on the west than on the east of the delta. The striking asymmetry of the delta is thus in part explained. The deeper water on the east will particularly facilitate the yearly advance of the bars on that side. But the direction of advance will be affected by a more positive cause. It is well known that the bar at each pass is breached during the flood season, and beyond the lower end of the new channel the delta is pushed forward for the remainder of the season. While the bar thus built in a new position is left essentially undisturbed by the river itself during the following half-year of low water, the transverse Gulf current (which is aided in the work by westward drift in the line of breakers on the bar) may be conceived as modifying the form of the bar during same period. The bar will be weakened on the left-hand extremity where the impact of the current is first felt, and strengthened on the right by the accretion of the silt traveling under the impulse of the current thus along the axis of the bar. The right-hand extremity of the bar will also tend to grow the faster in height and breadth, because of the sedimentation occurring in the low water season, since the river water over the bar is then borne upon the back of a west-flowing salt water wedge. The left-hand extrem-

ity of the bar, weak on account of the relative lack of deposition, and weakened by the transverse scour of the Gulf current, will invite the strengthening river-current of the next flood-time to break through the bar at that end. In this way, there will be a transference of the river axis, year by year, toward the left. In the meantime the delta has necessarily grown most rapidly to the right of the river-mouth.

The same phenomenon appears to be represented in the Rhône and the Ebro (Figs. 2 and 3).



FIG. 2. The delta of the Rhône. Symbols as in Fig. 1.

In each there are a pronounced leftward deflection of the river axis and a corresponding asymmetry of delta, coupled with a prevailing marine current sweeping past the river mouth from left to right. In all three cases, we have departures from the usual scheme of deflection, where the axis of the river is directed down stream with respect to the marine current. The conditions for this exceptional behavior are: (1) a powerful river characterized by a stable channel, and a delta growing so rapidly as to preserve one or more distributing arms; (2) a nearly tideless receiving water-body with a relatively steady current transverse to the river axis; (3) a volume of river sediment greater than that of the shore-waste migrating toward the delta under the impulse of the littoral current.

The shape of the bottom, the feeble tidal currents and the influence of mud-lumps probably have a small effect on the shape of the delta as a whole, but no other explanation is doubtless so weighty as that found in the force

of the earth's rotation. In the northern hemisphere, it tends to produce left-hand deflection of an *aggrading* river. It is true that the rel-

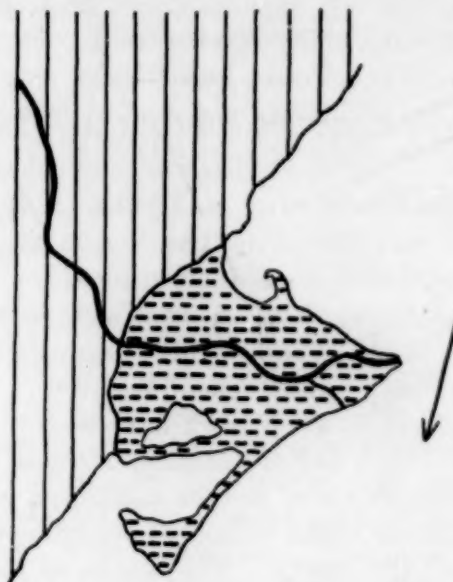


FIG. 3. The delta of the Ebro. Cross-hatching indicates older land. Broken lines indicate alluvium. The arrow shows the general direction of the marine current prevailing at the river mouth.

active straightness of river distributaries would permit of but a small proportion of the deflective force of rotation as affecting a meandering stream; but, small as it is, this force may be competent to produce strong asymmetry of a delta, since the friction of water against water is of a low order. It happens that in the three cases above noted, the marine current runs in a direction which would control the delta-building in the same sense as that expected from the influence of the earth's rotation. What is needed, among other tests of the current hypothesis, is a set of examples where the deflection of the river and delta is in appropriate relation to the corresponding currents, but in a sense opposed to that expected as a result of the earth's rotation. One purpose in outlining the hypothesis here in its present brief form is to invite observation on this point. Another obvious test is experiment. Some rough trials with artificial deltas, made on the tidal flats of the Annapolis Basin, Nova Scotia, seemed to confirm the hypothesis, but other and more thorough experiments are needed. Whatever be the explanation finally arrived at, it seems highly probable that this repeated occurrence

of deltas, possessing similar and rather highly specialized features, cannot be referred to merely accidental conditions governing the forward growth of the deltas.

R. A. DALY.

HARVARD UNIVERSITY.

THE NEW MEXICO BIOLOGICAL STATION.

THE Biological Station was founded as an independent institution at Mesilla in 1896. In 1899 it was moved to Las Vegas, and held a successful summer session in the New Mexico Normal University. A brief session was also held in 1900. The students in attendance have been mostly public school teachers. The results of the research work have been published in the *Annals and Magazine of Natural History*.

The Station will now be conducted as a part of the work of the biological department of the Normal University. The session of 1901 commenced on the 1st of June. A course in nature study is offered to public school teachers, and opportunities are afforded for research work along a number of different lines.

Las Vegas offers excellent opportunities for biological work. The summer climate is very good, and at no time is the heat excessive, as it is at lower altitudes in New Mexico and other parts of the Southwest. The altitude is about 6,400 feet, with mountains close by, rising above 11,000 feet.

Four distinct life-zones, the Upper Austral, the Transition, the Canadian and Hudsonian can be studied within 35 miles of Las Vegas. It results from this that the local fauna and flora are extremely rich in species; in the Hudsonian zone are forms of circumpolar distribution and others ranging to Alaska, though not to Asia or Europe; in the Canadian zone we find types identical with those of the mountains of the Northern States and of Colorado; in the Transition a varied assemblage typical, in part, of the foothill region of the Rocky Mountain range; in the upper Austral many species characteristic of the arid southwest, some ranging far southward and westward. With all this comes a certain percentage of local or endemic types, just how numerous further research must determine. Such are the snail *Ashmunella thomsoniana porteri* and the magnificent butter-

fly *Argynnis nitocris nigrocærulea*, both found in Sapello Cañon.

The Gallinas River, flowing through Las Vegas, contains a crayfish (*Cambarus gallinus*), described as new last year, some interesting fishes (*Leuciscus* and *Rhinichthys*), and a variety of aquatic insects, algæ, etc. The Hot Springs, six miles away, contain some peculiar organisms, which have not yet been sufficiently examined.

In the Arroyo Pecos, and elsewhere in the immediate vicinity of the town, is an immense alluvial deposit of Pleistocene age, containing innumerable remains of mollusca and occasional mammalian fragments. Special facilities are offered to students of wild bees (*Apoidea*), the available collections and literature being very extensive. Facilities are also offered for the study of *Coccidæ* and other groups of insects. Students should, if possible, bring their own microscopes, slides, forceps and other accessories.

T. D. A. COCKERELL.

ANNOUNCEMENT CONCERNING THE THIRTEENTH SUMMER MEETING OF THE GEOLOGICAL SOCIETY OF AMERICA.

Sessions.—The thirteenth summer meeting of the Society will be held in Denver on Tuesday, August 27th, in the East Denver High School building. The Council will meet on Monday evening at the hotel headquarters. The Society will be called to order by the President, Mr. Charles D. Walcott, on Tuesday morning, immediately following the general session of the American Association for the Advancement of Science.

Program.—The preliminary list of papers will be mailed about August 1st, and no supplementary list will be sent. The Fellows are requested to send their abstracts on the printed form as promptly as possible, and not later than July 15th. By the rule of the Council abstracts are required. Papers offered for printing should be fully described on the blank forms, extra copies of which will be promptly sent on request.

Hotel Headquarters.—The Brown Palace Hotel has been selected by the local committee, A. A. A. S., as headquarters. The regular

rates at the hotel, are \$1.50 per day and upwards on European plan, and \$3.00 to \$5.00 per day, American plan. Reduced rates will doubtless be made for the meeting.

Transportation.—The Western Passenger Association, covering the territory west of Chicago and St. Louis, has made a rate of one fare plus \$2.00 for the round trip, in their territory, to Denver, Colorado Springs and Pueblo. The tickets may be bought from July 10th to August 31st, and are good for return up to October 31st. At this rate the fare from Chicago to Denver and return will be \$31.50. The Pullman fare is \$6.00 extra, each way.

Further details will be found in the A. A. A. S. circular, which will be issued soon.

Geological Excursions.—A circular has been sent to all Fellows, describing an extended excursion through Colorado planned by Professor C. R. Van Hise, Chairman of Section E, for the ten days (Aug. 17–27) preceding the meeting. For information concerning this trip request should be made to Professor Van Hise, Madison, Wis.

The Secretary of the Denver Local Committee writes as follows:

“Geological excursions which are likely to be arranged by the local committee are as follows, but subject to change: An all-day railroad excursion to Mt. Alto and Ward; one to the mesas at Golden; one to Morrison, to the Garden of the Titans, to study the magnificent exposure from the red beds of the Triassic to the uppermost beds of the Denver formation; to the classic ground where were obtained the first *Atlantosaurus* and *Stegosaurs*; to the Pleistocene deposits near Denver. At Colorado Springs excursions will be taken to the Garden of the Gods; to the mineral springs at Manitou; and to the top of Pike’s Peak. The greatest gold camps of the world, Victor and Cripple Creek, will also be visited.”

The preliminary circular of the A. A. A. S. will be sent to Fellows of the Geological Society, who are not members of the Association, upon request to the secretary of the local committee, Mr. Arthur Williams, Denver Chamber of Commerce. All arrangements described in the association circular, relating to entertainment, transportation, etc., apply to the Geological

Society and other societies which meet in conjunction with the Association. Details will be found in that circular which cannot be given here.

Express and Mail.—Matter for use at the meeting should be sent in care of the janitor, East Denver High School building. It should bear the shipper’s address and be fully prepaid.

HERMAN LE ROY FAIRCHILD,
Secretary.

ROCHESTER, N. Y.,
June 7, 1901.

SCIENTIFIC NOTES AND NEWS.

AN official announcement has now been made in regard to the Rockefeller Institute for Medical Research, toward the establishment of which Mr. John D. Rockefeller has recently given \$200,000. The directors are: William H. Welch, M.D., Baltimore, President; T. Mitchell Prudden, M.D., New York, Vice-President; L. Emmett Holt, M.D., New York, Secretary; C. A. Herter, M.D., New York, Treasurer; Theobald Smith, M.D., Boston; Simon Flexner, M.D., Philadelphia; H. M. Biggs, M.D., New York. The purpose of the foundation, as the name implies, is to furnish facilities for original investigation, particularly in such problems in medicine and hygiene as have a practical bearing upon the prevention and treatment of disease. The sum of money mentioned above is not an endowment, but may be used for current expenses. The Institute will be situated in New York City. A building will not, however, be erected at present, but research will be conducted in existing laboratories under the auspices of the directors.

PRESIDENT DAVID STARR JORDAN and Dr. Barton W. Evermann sailed from San Francisco on May 30th to conduct the investigation on the fishes of the Hawaiian Islands to which we have called attention.

PROFESSOR ASAPH HALL has resigned the lectureship in celestial mechanics at Harvard University, and will spend the next year or two abroad.

PROFESSOR HENRY F. OSBORN, of Columbia University and the American Museum

of Natural History, is at present in the Bad Lands of South Dakota, planning the work to be carried on this summer by the American Museum and the U. S. Geological Survey.

DR. A. SMITH WOODWARD, of the British Museum, has, since the beginning of April, been carrying on excavations at Pikermi, near Athens, where many interesting vertebrate fossils have been found.

PROFESSOR STEWART CULIN, of the University of Pennsylvania, is at present on a visit to Cuba and Porto Rico. On his return he will visit the Indian tribes of the Northwest in the interest of the museum.

PRESIDENT JAMES LOUDON, of the University of Toronto, is at present attending the celebration of the University of Glasgow, and will later visit the universities of England and the Continent to obtain information for use in erecting the new science building of the university. During his absence Professor R. Ramsay Wright, of the chair of biology, is acting president. Principal John Galbraith, of the School of Practical Science, has been visiting the scientific schools in the United States, also with a view to the new building at Toronto.

At the last annual meeting of the American Academy of Arts and Sciences, \$145 was appropriated from the C. M. Warren Research Fund to Dr. Charles H. Herty, University of Georgia, for purchase of material to be used in an investigation of the constitution of complex platinum compounds.

ONE of the Carnegie Research Fellowships of the Iron and Steel Institute of Great Britain has been awarded to Mr. John A. Matthews, who at present holds the Columbia University Barnard Fellowship.

THE Soemmering prize of the Senckenburger Natural History Society, of Frankfort, has been awarded to Professor Franz Nissl, of Heidelberg, for his researches on the minute anatomy of the nerve cell.

THE Director-General of the British Army Medical Service, Surgeon-General J. Jameson, C.B., retired on June 1.

THE seventh Robert Boyle lecture at Cambridge University was delivered by Professor

Sylvanus P. Thompson on June 6, his subject being 'Magnetism and Growth.'

PROFESSOR VOLNEY G. BARBOUR, for thirty-one years professor of civil engineering in the University of Vermont, died in Minneapolis on June 4.

THE eminent paleontologist, Professor Gustaf Lindström, keeper of the department of fossil animals in the Royal Museum, Stockholm, Sweden, died on May 16, last, at the age of 72 years. Dr. Lindström, who in 1876 was appointed successor of Professor N. Angelin in the Royal Museum, was well known among paleozoic investigators all over the world. He was an eminent scholar, and his works on paleontology and archeology are distinguished by their accuracy and thoroughness.

DR. KARL ZELLER, docent in theoretical astronomy in the German Technical Institute at Brünn, died on March 13, at the age of 46 years.

THE following is a translation by Professor J. C. Branner, of Stanford University, of a decree issued at Pará, Brazil, by the Governor of that State in regard to the Natural History Museum, hitherto known as the Museu Paraense: "In view of the valuable services rendered by Dr. Emilio Augusto Goeldi, director of the Museu Paraense, in the organization of that important establishment, adapting it to the scientific purposes for which it was founded and enriching it by his efforts with valuable materials which have brought it to its present degree of prosperity; and considering that this distinguished official has dedicated himself with praiseworthy devotion to those subjects which bear upon the progress and improvement of this State, effectively contributing to its good name abroad; and considering that he brought to bear the valuable help of his scientific knowledge in the study and comprehension of our rights in the question of boundary with French Guyana: It is resolved, as a testimony of the gratitude of the State to the said official, to give to the Museu Paraense the name of the *Museu Goeldi*."

PROFESSOR C. S. SARGENT, of Harvard University, acknowledges the receipt of \$126,485 for an addition to the endowment fund of the Arnold Arboretum.

MR. J. PIERPONT MORGAN has given to the Cooper Union Museum a collection of textile fabrics, the value of which is estimated at over \$50,000. The collection, including the Bodia collection of Barcelona, the Rivas collection of Madrid and the Baron collection of Paris, very completely illustrates the history of weaving through the middle ages to the end of the seventeenth century.

ENGLISH journals report that the national collection of Lepidoptera in the Natural History Museum at South Kensington has recently been greatly enriched by the addition of the almost unique collection of butterflies from Europe, and Central and Eastern Asia, together with the collection of European moths, formed by the late Mr. John Henry Leech, of Hurdcott-house, Salisbury. Arrangements had been made during Mr. Leech's lifetime under which the museum became possessed of his eastern Asian moths, and now the same public institution has acquired the still more important accessions adverted to, through the munificence of his mother, Mrs. Leech, of Kensington Palace gardens. It is understood that the museum authorities will publish a catalogue of the butterfly collection. Of *Rhopalocera* there are rather more than 18,000 specimens, representing some 1,100 species, among which are over 400 male and female types of species described by Mr. Leech. This collection of Palearctic butterflies is very rich in Chinese and Japanese species, and in local forms and aberrations of European species. The European *Heterocera* number about 23,000 specimens, including some fine aberrations and extensive series of the variable species. The collection of eastern Asian moths, from which the museum had already made a selection, comprised nearly 3,000 species, of which about 800 were made known to science by Mr. Leech.

A MEETING was held in Dublin on May 17 for the purpose of advocating a pathological institute for Dublin. Delegates were present from various institutions, and plans were adopted for a laboratory intended primarily for research work.

As a return for the courtesies extended to members of the American Institute of Electrical

Engineers during their visit to London last year, an illuminated address was prepared and was presented to the British Institution of Electrical Engineers on May 30.

THE American Medical Association, which met at St. Paul last week under the presidency of Dr. C. A. L. Reed, decided to meet next year at Saratoga. Dr. John A. Wyeth, of New York, was elected president.

THE third quinquennial Congress of Medical Men and Naturalists of the Czech and Slav nations was held at Prague on May 25 to 29, under the presidency of Dr. Jaroslav Hlava, professor of morbid anatomy in the Bohemian University at Prague. More than nine hundred members were in attendance.

THE Department of State has received a note from the minister of the Netherlands, dated Washington, May 22, 1901, stating that the Fifth International Congress of Criminal Anthropology will be held in Amsterdam from September 9-14, 1901. The principal questions to be discussed are: First, anatomical and physiological characters of criminals, descriptive studies; second, criminal psychology and psychopathology, criminals and lunatics, theoretical considerations and practical measures; third, criminal anthropology in its legal and administrative application, principles to be followed, preventive measures, protective measures, penalties; fourth, criminal sociology, economic causes of crime, criminality and socialism; fifth, criminal anthropology and ethnology compared. Special questions, such as alcoholism, sexuality, juvenile criminality, senile criminality, hypnotism, criminal psychology in literature, etc., will also be considered.

THE Geological Survey of South Dakota was treated more liberally by the last Legislature than in former years. It is therefore planned to prepare and publish soon a bulletin on the mineral resources of the State, giving the production for the year 1900, and, later, another on the water supplies, treating particularly of the Artesian areas. A reconnaissance is purposed for the coming summer into the region of the Moreau and Grand rivers. The persistent rumors of the occurrence of coal there will be investigated. As it is a region less known and

less settled than others, special attention will be given to the native plants and animals. The prevalent formations there are the Fox Hills of Hayden and the Laramie. The original localities of the former will be visited and collections made. The personnel of the Survey at present is as follows:

J. E. Todd, A.M., professor of geology, State University, Vermillion, *State Geologist*.

C. C. O'Harra, Ph.D., professor of geology, State School of Mines, Rapid City, *Assistant Geologist*.

C. P. Lommen, B.S., professor of biology, State University, Vermillion, *Assistant in Zoology*.

D. A. Saunders, A.M., professor of botany, State Agricultural College, Brookings, *Assistant in Botany*.

MR. D. I. BUSHNELL is about to undertake a trip of reconnaissance to southwestern Missouri and northwestern Arkansas to examine caves in the White river region which is practically unknown to the archeologist.

WE learn from the London *Times* that the Department of Agriculture and Technical Instruction for Ireland has, with the concurrence of the Agricultural Board and the Board of Technical Instruction, allocated a sum of £5,000 to the purposes of the Cork Exhibition, 1902, to be applied on condition that the general scheme of the exhibition is approved by the department. A portion of this sum will be devoted to the organization by the department of an exhibit of products, appliances, and processes relating to industries which are capable of being introduced into Ireland, or, where already established, of being developed on the most modern lines.

THERE was held last month in the Paris Jardin des Plantes, the first exhibition of useful plants cultivated in the colonies.

THE French Jesuits of the Shanghai Mission have for some time maintained a meteorological observatory at Zi-Ka-Wee, and they have now established an astronomical observatory on the summit of a hill about twenty miles distant. The two institutions are to be connected by wireless telegraphy. Father Chevallier is to have charge of the new observatory.

THE mirror, being made by Mr. John A. Brashear for the reflecting telescope of Lick Observatory, was accidentally broken on June 5. It is feared that this will delay the ex-

pedition from the observatory to the Southern Hemisphere, as glass for a new mirror must be imported from France.

THE New York *Evening Post* states that the Mexican government has refused to allow a collection of antiquities gathered there by Marshall H. Saville, assistant curator of the American Museum of Natural History, to be shipped out of the country. Mr. Saville returned about six weeks ago from a six months' trip in Mexico, and will go back to that country in September, when he expects to have the dispute adjusted. The Mexican law forbids the export of antiquities, but the Museum has a contract with that government by which it is empowered to take duplicates of specimens.

THE government has decided to exclude immigrants suffering from tuberculosis.

BEGINNING with the present year Spain has adopted Greenwich time, which is 14 min. 46 sec. in advance of that of the meridian of Madrid which had previously been used.

IT is planned to have an extensive exhibit of Röntgen ray apparatus at the meeting of German Scientific Men and Physicians which is this year held at Hamburg beginning on September 22.

ACCORDING to the census taken on March 31, the population of England and Wales was 32,525,716, being an increase of 12.15 per cent. in ten years. The increase in the preceding decennium was 11.65. The percentage increase of London was only 7.3 per cent., its population now being 4,536,034. There has, however, been a large increase in the surrounding country, the population of Middlesex having nearly doubled. The population of Ireland is 4,456,546 and of Scotland 4,471,957. The change in the population of Ireland and of Scotland in the past sixty years is remarkable:

Year.	Ireland.	Scotland.
1841	8,197,000	2,620,000
1851	6,574,271	2,888,742
1861	5,798,967	3,062,294
1871	5,412,377	3,360,018
1881	5,174,836	3,735,573
1891	4,704,750	4,025,647
1901	4,456,546	4,471,957

THE number of applications for patents in Great Britain last year was 23,922, as compared

with 25,800 in 1899. The highest point was reached in 1897 with 30,952. It is somewhat interesting to note that, while there has been a falling off in the number of patents granted to citizens in the United Kingdom and also to citizens of Germany and France, the number of applications from the United States increased from 3,002 in 1899 to 3,189 in 1900.

THE English papers state that a complete installation of Marconi's wireless telegraphy, specially suitable for signalling purposes as used in the navy, has been fitted on board the *Elder, Dempster* Beaver liner, *Lake Champlain*. This installation is the first which has been fitted on any of the Atlantic liners sailing from Liverpool. The *Lake Champlain* left the Mersey for Halifax on May 21, with over 1,000 passengers, and arrangements were made to establish communication between the vessel and the Marconi wireless telegraph station at Holyhead. At 9:37 P. M., when off the Skerries, contact was obtained with the Holyhead station, the vessel being then 13 miles distant. Numerous telegrams were then forwarded from passengers to friends in all parts of the United Kingdom, each message being acknowledged by the receiving operator. Constant communication with the station was continued until 1 A. M., the vessel being then 37 miles distant. Communication was established with the Marconi station at Rosslare, and at 4:30 A. M., a fresh batch of telegrams was forwarded, notifying the vessel's arrival off the Tuskar Light to the owners, Messrs. Elder, Dempster & Co.

ACCORDING to Reuter's Agency the ice-breaker *Yermak* will leave Kronstadt on May 29 for Newcastle, and, after coaling there, will proceed to Tromsø to cooperate in the fresh phase of the Spitzbergen expedition for the measurement of the terrestrial meridian. It is expected that by the end of June next she will be able to return to Tromsø and take on board Vice Admiral Makaroff, who is to direct the projected Arctic expedition. In the course of this expedition she will coast round Novaya Zemlya in order to determine precisely the outlines of that island. The *Yermak* will next inspect the state of the ice on the channel leading to the Yenisei River, in order to ascertain the correctness of the widely held theory that the

passage to the Siberian rivers to the north of Novaya Zemlya is better than that by the Yugor Strait. Lieutenant Isliamoff, the astronomer, M. Weber, the geologist, and M. Vukuloff, the chemist, will take part in the Arctic expedition.

UNIVERSITY AND EDUCATIONAL NEWS.

MR. ANDREW CARNEGIE has transferred \$10,000,000 to trustees for university education in Scotland. The trustees include Lord Rosebery, Lord Kelvin, Mr. John Morley and other eminent Scottish citizens. It is expressly stated in the deed of gift that the fund is intended to improve and extend the opportunities for scientific research in the universities of Scotland and to facilitate attendance by paying the fees of students; and it is understood that the income will be divided equally between these two objects. The departments to be strengthened are science, medicine, modern languages, English literature and history.

IN view of Mr. Carnegie's great gift for Scottish universities, the following statistics regarding attendance and fees, published in a British parliamentary paper, are of interest. It will be noted that one-half of the income of the fund would pay all fees. The summer sessions, attended by 431 students, are not included.

Winter Session, 1899-1900.

	Men.	Women.	Total.	Fees.
St. Andrews.....	264	114	378	£2,934 4 6
Glasgow	1,604	329	1,933	13,597 10 0
Aberdeen	661	107	768	5,169 13 6
Edinburgh.....	2,427	250	2,677	19,889 18 7
Total.....	4,956	800	5,756	£41,591 6 7

THE University of Glasgow has received subscriptions amounting to £38,000 toward an increased endowment. This sum includes an anonymous gift of £5,000 for the department of physiology. Among the donors of subscriptions of £1,000 are Lord Kelvin, Lord Rosebery and Mr. J. S. Kennedy, of New York.

COLUMBIA UNIVERSITY has received an anonymous gift of \$20,000, of which \$10,000 is for the purchase of books, \$5,000 for a historical reading room and \$5,000 for general purposes. Barnard College has received \$1,500 for fitting up the zoological laboratory. Teachers Col-

lege has received an endowment for three fellowships of the annual value of \$500 from Mr. John D. Rockefeller, and one from Mr. John Crosby Brown. These fellowships are to permit southern teachers to carry on advanced work.

MRS. PHILIP D. ARMOUR and Mr. J. Ogden Armour have added \$250,000 to the \$1,000,000 recently given by them to the Armour Institute, Chicago. A building for the Armour Memorial School of Engineering will be erected at once.

CARSON-NEWMAN COLLEGE, a Baptist institution, of Tennessee, has collected an endowment fund of \$60,000, of which Mr. J. D. Rockefeller gave \$45,000.

A BUILDING for the scientific department of the U. S. Grant University, at Chattanooga, Tennessee, will be erected at a cost of \$23,000. Of this sum the Hon. W. M. Banefield has given \$5,000.

ELABORATE ceremonies are this week in progress at Glasgow in connection with the ninth jubilee of the university. Among the events of special scientific interest are an address by Lord Kelvin on James Watt, who carried on his work at the old college, and an address by Professor John Young on William Hunter. The new botanical laboratories were to have been opened by Sir Joseph Hooker on the 13th. Delegates have been sent from the English universities and societies and from a number of American and foreign institutions.

AT the annual commencement exercises of the University of Colorado, held in Boulder, Colo., June 6, 1901, seventy-four degrees were conferred as follows: 11 B.A., 17 B.Ph., 14 B.S., 1 B.L., 4 M.A., 2 M.S., 8 M.D., 12 LL.B., 2 B.S. (C.E.), 3 B.S. (E.E.).

THE School of Pedagogy, of the New York University, has been reorganized. The Chancellor of University, Dr. H. M. McCracken, will act for the present as dean. Dr. J. P. Gordy, professor of education in the Ohio State University, has been called to the chair of the history of education and Dr. Robert MacDougall, of Harvard University, to the chair of experimental psychology. A number of professors of the University have been added to the

faculty of the School of Pedagogy, including Professors J. J. Stevenson (natural history), D. W. Herring (physics), Morris Loeb (chemistry) and C. L. Bristol (biology).

MR. M. N. FENNEMAN has been appointed professor of geology in the University of Colorado. He will begin his work in January next, at which time he will receive the Ph.D. degree from the University of Chicago.

AT Harvard University, J. G. Love has been promoted to an assistant professorship of mathematics, and Albert Sauveur to an assistant professorship of metallurgy.

DR. W. R. STOKES, city bacteriologist at Baltimore, has been elected professor of pathology in the College of Physicians and Surgeons of that city.

DR. FRANCIS H. SNOW has resigned the chancellorship of the University of Kansas, but will retain the chair of natural history.

S. GIST GEE, professor of natural science of the Columbia (S. C.) Female College, has accepted a position in the Chinese University at Soochow.

MR. HAROLD B. HARTLEY has been elected to a science fellowship at Balliol College, Oxford.

M. DÉJERINE has been appointed professor of the history of medicine in the University of Paris. There is some complaint because this chair is used as a stepping-stone to other professorships. It is said that M. Déjerine will soon be transferred to a chair of nervous pathology and will be succeeded by M. Ballet who has undertaken to devote himself permanently to the history of medicine.

DR. WILHELM SALOMON, associate professor of mineralogy at the University of Heidelberg, has been appointed director of the Institute of Paleontology and Stratigraphy and his title has been changed to associate professor of paleontology and stratigraphy. Dr. V. Hepperger has been promoted to a full professorship in astronomy in the University at Vienna. Dr. Wolf Müller has qualified as docent in chemistry in the University at Freiburg, i. B.; Dr. Jordis, in inorganic chemistry in the University at Erlangen, and Dr. Kallmann, in electricity in the Technical Institute at Berlin.